DIV. OF FISHES

# COMMERCIAL FISHERIES Review

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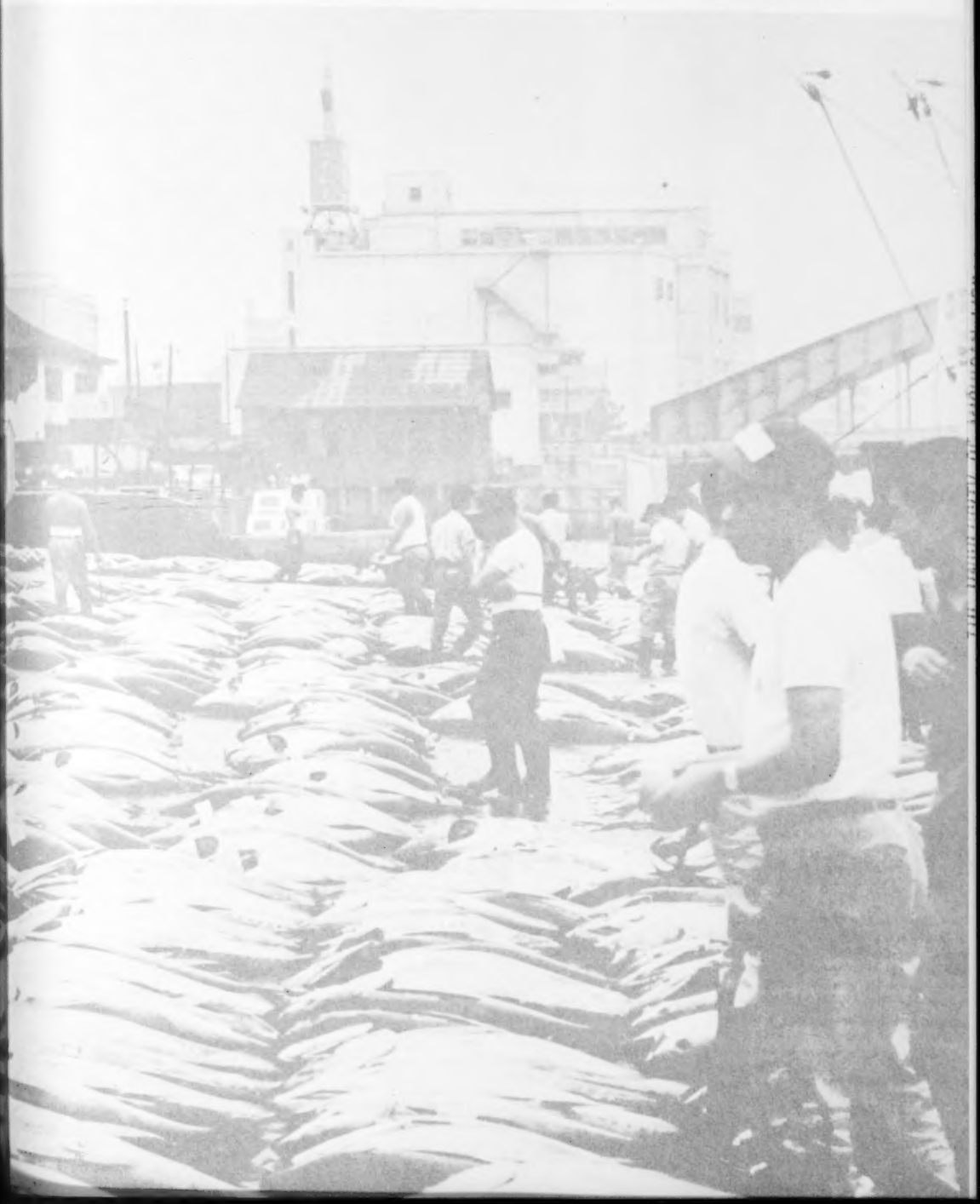

COVER: Part of tuna section at Tokyo Fish Market.
(Photo: E. Edelsberg)

# COMMERCIAL FISHERIES

## Review

A comprehensive view of United States and foreign fishing industries--including catch, processing, marketing, research, and legislation--prepared by the Bureau of Commercial Fisheries.

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Gloucester, Mass.

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## "Miller Freeman" Joins BCF Fleet

A $4-million, 215-foot research vessel that will study the fishery resources of the North Pacific and the Bering Sea and can cruise 13,000 miles at 14-15.5 knots has become the newest member of the BCF fleet. She is the "Miller Freeman," commissioned in Seattle, Wash., on September 9 after an 8,000 mile trip from the yards of the American Ship Building Corporation in Lorain, Ohio.

The vessel is assigned to BCF's Seattle regional office. She will contribute much to the Bureau's studies of such groundfish as halibut, flounders, and cod, the distribution of salmon, and of the sea's mysteries.

The Miller Freeman has aquaria and biologic, electronic, and oceanographic laboratories. She has accommodations for 10 scientists and 26 crew members. She boasts several unusual features: a center-board to reduce the roll at sea; 2 evaporators to distill 3,600 gallons of seawater daily to provide fresh water; a room-sized tank to hold live specimens; and an atomic-energy irradiator to preserve fresh fish.

The vessel is named for Miller Freeman, founder and publisher of the "Pacific Fisherman," who died in 1955. He proposed several of today's international agreements on fishery resources.

# 1967 U. S. CATCH MAY BE LOWEST IN 25 YEARS

In mid-September, the latest figures on the U. S. catch of fish and shellfish indicated that landings in 1967 would be about 4.1 billion pounds--200 million below 1966 and the lowest in 25 years.

Landings are down appreciably in Alaska and New England. They are up, or at about the 1966 level, in other areas.

Changes in the year-to-year catch of certain species are particularly noteworthy in 1967.

Canned Salmon Pack Lowest This Century

Salmon used for canning in Alaska was down about 170 million pounds from 1966. The canned pack was the lowest in this century.

This year's total Alaska salmon catch probably will not exceed 150 million pounds--183 million less than 1966--and lowest since the 1959 landings of 147 million pounds.

The catch of all salmon species, except kings, was less. Pinks and reds were showing the greatest decline, followed by chums and cohos. The records of the previous ten years indicate that the 1967 catch of pinks was about 45 percent less than 1965; it was slightly less than landings in 1957, 1958, and 1960. The catch of reds was about the same as in 1962 and 1964, but exceeded landings in 1958, 1959, and 1963.

Other Species Decline

So far this year, certain species other than salmon registered declines from 1966:

- Menhaden was down 60 million pounds.

- Haddock, whiting (silver hake), king crabs, and Atlantic flounder landings were less by 20, 17, 16, and 12 million pounds, respectively. Ocean perch, Pacific halibut, sea scallops, and Atlantic cod landings also were down from the 1966 catch.

Shrimp Landings Increase

The decline in the total catch was offset partially by significant increases in landings of shrimp, the country's most valuable species. They rose 46 million pounds.

- The tuna catch was up--yellowfin and skipjack tuna increased 38 and 25 million pounds; bluefin and albacore were down from 1966.

- California anchovies, Pacific hake, and bonito were up 20, 18, and 5 million pounds, respectively.

No significant trend in the catch of other important species was discernible as the 3rd quarter of 1967 began.

From January through July, total imports of fishery products were 900 million pounds (round weight basis) greater than in the same period of 1966. Fish meal imports were up 1 billion pounds (round weight). Edible fishery products were down 100 million pounds. (BCF Branch of Fishery Statistics.)

# UNITED STATES

## Hurricane Beulah Battered Shrimp Fleet

In the early morning of September 20, Hurricane Beulah, propelled by winds of up to 160 m.p.h., smashed into the Brownsville, Texas, area. She destroyed many millions in property, made thousands homeless, and paralyzed the area. President Johnson designated it a "disaster area".

Beulah struck the South Texas shrimp fleet at about its peak production period. She knocked out of service about 8 percent of the boats--and sent to the bottom with many of them (in Brownsville and Port Isabel) about 100,000 pounds of shrimp that could not be unloaded in time.

Federal agencies moved quickly to aid the fishermen. The Bureau of Commercial Fisheries announced that the two Interior Department loan programs it administers were available to help replace losses.

The Small Business Administration (SBA) of the Commerce Department announced that its disaster loans, designed to take care of losses not covered by insurance claims, also are available to help restore applicants to pre-hurricane condition.

### DAMAGE TO SHRIMP INDUSTRY

Preliminary estimates put the damage to the shrimp industry at $25-40 million. This includes 85 to 90 shrimp vessels sunk or beached; 150 more with considerable damage to their hulls; 6 processing plants destroyed, and many others damaged extensively; and shrimp lost on vessels or in cold storage when the electricity was knocked out.

### BCF'S LOAN PROGRAMS

1. New commercial fishing vessels may be financed through BCF's Mortgage Insurance Program. This insures mortgages up to 75 percent of the construction cost. The mortgages have maximum interest rates of 6 percent, 15-year maturities, and one percent insurance premiums.

2. The purchase of used vessels may be financed through the Fisheries Loan Program directly from the Government--instead of from private sources as in the Mortgage Insurance Program.

### SBA LOANS

Its disaster loans require only 3 percent interest. Generally, however, SBA will not allow disaster loans for upgrading property. This means that a man who lost a $10,000 vessel would not receive a loan to buy a more expensive vessel.

SBA has opened an office in Corpus Christi and is opening others in the Brownsville area.

## Boston Holds Commercial Fish Exposition

A commercial fish exposition designed to bring together under one roof the major suppliers of fishing and processing equipment--and hundreds of experts from the United States and abroad--is being held in the Suffolk Downs Exposition Hall, Boston, Massachusetts, October 10-14. Its sponsor, "The Boston Globe," sees the exposition as a necessary opportunity for all segments of the fishing industry to discuss domestic and international fishing problems. The exposition is billed as the first international forum for products and ideas held in the Western Hemisphere. Between 5,000 and 10,000 persons from 27 countries are expected to attend.

Over 100,000 square feet of space are devoted to the exposition--more than 150 exhibitors and 200 booths. The exhibits include: vessel design and construction; naval architects and boat builders; propulsion and power; propellors and transmissions; gears and hydraulic haulers; detection equipment and techniques; nets and ropes; twines and cables; buoys and lobster pots; electronics, radar and sonar; pumps, winches and gear; fish handling equipment; processing and packaging machinery; preserving and refrigeration; breading machinery, ice making machinery; chlorinators; packaging and containerization; modern transportation methods; seafood processing and packaging.

Speakers and Seminars

Under Secretary of the Interior David S. Black is the featured speaker at the opening dinner on October 10. Senator Edward M. Kennedy of Massachusetts is the featured speaker at the Fish and Seafood Dinner on October 13. Gordon O'Brien, manager of the Canadian Fisheries Council, speaks on problems facing world's fishing industry, particularly of Canada and U. S., on Canada Day, October 13.

Senator Warren G. Magnuson of Washington, chairman of Senate Commerce Committee, conducts seminar, October 11, on government subsidies to fishing fleet, and answers questions of a panel of shipbuilder, ship owner, and naval architect.

On October 12, there are two 1-hour seminars: "Propulsion"--the efficient use of diesels; "Modern Fishing Techniques"--"How Scottish Seining can increase catch up to 8 times over current methods." On October 13, "Electronics"--latest techniques and equipment for detection and communication; and "The Captains Speak Out"--successful captains discuss industry problems from the fisherman's point of view.

## Conflict Over the Atlantic Estuaries

The oceans of the world are not full of fish. As a matter of fact, says David Bulloch, acting president of the American Littoral Society, "the deep ocean is a desert. Only scattered oases of fish life occur where currents converge or an undersea mountain rises near the surface. The real abundance of sea fish is close into land, along open coasts and in the deep bays, and tidal waters of estuaries. Here they are vulnerable to all man's activities. Because we are not practicing conservation of estuaries, we will be faced with threats of serious depletion of fish resources if something isn't done soon."

Bulloch had in mind the quickening pollution of the coastal waters and the physical damage to the estuaries, shallow tidal lands, rivers, lagoons, bays, and sounds along the U. S. coasts--findings of an 84-page, illustrated booklet, "Fish & Man," written by John Clark, and published recently by the American Littoral Society.

Several of the Society's conclusions are:

- "Fish resources are the economic mainstay of hundreds of coastal communities. Salt water fishing is a three billion dollar business in the United States. Commercial fishing is the key to prosperity for many seaside towns while sportfishing supports the economy of many resort areas. Apart from any economic gain, fishing provides a necessary recreational outlet for many of our people. Fish resources of the seashores and bays of the Atlantic coast are in danger of depletion from poorly planned community and industrial development."
- "It is the sad truth that our Atlantic estuaries are not being maintained in good condition - instead they are being systematically demolished, altered or poisoned in almost every town and country along the sea coast. Big and small projects are gradually eating

away this precious environment and wreaking havoc with fish and shellfish resources harvested there. For example, Lake Worth, a Florida salt lagoon and historically a great salt water fish producer in the Palm Beach area, is now almost devoid of useful fish life."

• "Of the tidal wetlands along our North Atlantic coast, from Maine to Delaware, 45,000 acres of marshland were destroyed in the ten year period 1955-64. An accurate inventory kept for the last five of those years showed that 34 percent to fill for housing developments; 15 percent to recreational developments (park beaches, marinas); 10 percent to bridges, roads, parking lots, and airports; 7 percent to industrial sites; 6 percent to garbage and trash dumps; and 1 percent to other causes."

• "Other activities that may alter estuaries to the detriment of Atlantic coastal fish are digging of boat channels, mosquito work, gravel and sand mining, highways with oceans, marshes and dams and other water control structures."

The booklet explains that the waters of the ocean nearest land produce most of the fish because the shallow, brackish waters of the estuaries receive the fertilizing minerals washed into them from the land. Sunlight reaches to the bottom of bays and tidal rivers and stimulates lush plant growth. Estuaries are among the world's most fertile areas. Bait fish, worms, shrimp, plankton, and shrimp thrive--and they provide estuarine fish the nourishment they need for growth and health. Many coastal fish depend on the estuaries for sanctuaries or nursery areas.

The report does not brush aside the legitimate need by communities for some estuarine land. "Critical decisions must be made whenever progress conflicts with conservation of natural resources." But it urges that these decisions be made with care--after the facts have been gathered by experts and all parties have had their say.

The booklet contains summaries of the situation existing in the 14 states along the Atlantic Coast. Each state conservation agency reviewed its State's section.

## MAINE

The estuarine habitats of the lengthy coast line have suffered only minor physical damage. But it is necessary to plan orderly land use now to prevent the losses suffered by Connecticut, New York, and Florida. Maine's estuarine losses so far have resulted from dredging in shallow waters and piling the dredge spoil on good wetlands. There is little shore development now because more than 98½ percent of the coast is privately owned.

Maine and the U. S. are jointly acting to preserve some high-value marshes, particularly those between Kittery and Portland, by buying them for natural areas. "But local appreciation of the value of estuarine area appears to be lacking."

The estuarine areas, especially the tide flats, produce many clams. Estuarine conservation attention is now on shellfish. The estimated annual take from the flats range from $2,000 to $46,000 per acre. The flats also produce millions of dollars of sandworms and bloodworms each year. Mostly, they are shipped to states along the whole Atlantic coast as bait for sportfishermen.

## NEW HAMPSHIRE

"The estuarine zone of the New Hampshire coast is just now coming under serious attack." The better upland areas along the coast are being used up rapidly by developers, who also are encroaching on the marshes. The first marsh losses were caused by dredging and depositing of spoil on wetlands to make boat channels, marinas, housing lots, bridges, roads, and parking lots.

Seeing the menacing wave, several state agencies joined to preserve the marshes and mudflats through educational activities to acquire wetland property for conservation. They concentrated first on the "irreplaceable" Hampton marshes. "A small amount of acreage has been acquired but real danger still exists."

"A real roadblock to effective planning of New Hampshire estuarine land use is confusion over jurisdiction and ownership."

To preserve estuarine areas, they must be acquired for public management, or laws must be enacted to govern private land use--as is done in Massachusetts.

## MASSACHUSETTS

"With long coastline and miles of estuary, Massachusetts has taken a lead among states

in protecting its tidelands. . .has made outstanding progress in the past five years with a successfully combined scientific and legislative drive to protect its tideland habitats."

The Department of Natural Resources fashioned a crash program because of its deep concern for the future of salt water fish and shellfish resources, the plight of waterfowl and shore birds, the need to control erosion, and to protect "scenic, historic, and tourist values."

The Department conducted a research program that substantiated the importance of estuarine areas to fish. "The conclusion from all these studies is obvious--fishing in coastal waters around the Commonwealth would be nearly ended if all the estuaries were destroyed. And yet many forces are at work to adjust that."

To date, Massachusetts "has lost about 20 percent of valuable tide-marsh and estuarine habitat, but still retains about 45,000 acres to sustain the fisheries." The Department says "dredging and filling projects present the most overt threat to our coastal wetlands."

"Less than 10 percent of Massachusetts wetlands acreage has been protected by local action such as zoning. . . ."

Protective Legislation

Following the scientific studies, Massachusetts enacted legislation in 1963 giving legal control over coastal wetlands projects to the Department of Natural Resources. A supplementary act passed in 1965 gave the Department more authority to protect wetlands. "It provided for state acquisition by eminent domain; and for compensation to the owner in cases where the action amounted to land-taking." The Department also was given authority to set rules governing wetlands alteration. It is carrying out, in effect, an enforced zoning program by surveying the state's wetlands and assigning values to them.

If all levels of government and conservation groups continue their efforts, the state may succeed in protecting key precious estuarine habitat. "But much more acreage will have to be acquired by the state, the individual towns, and private or citizen conservation groups."

RHODE ISLAND

There is a series of shallow salt ponds all along Rhode Island's southern shore protected on the seaward side by strips of barrier beach. The ponds and adjoining marshes are rich nursery grounds for young salt water fish.

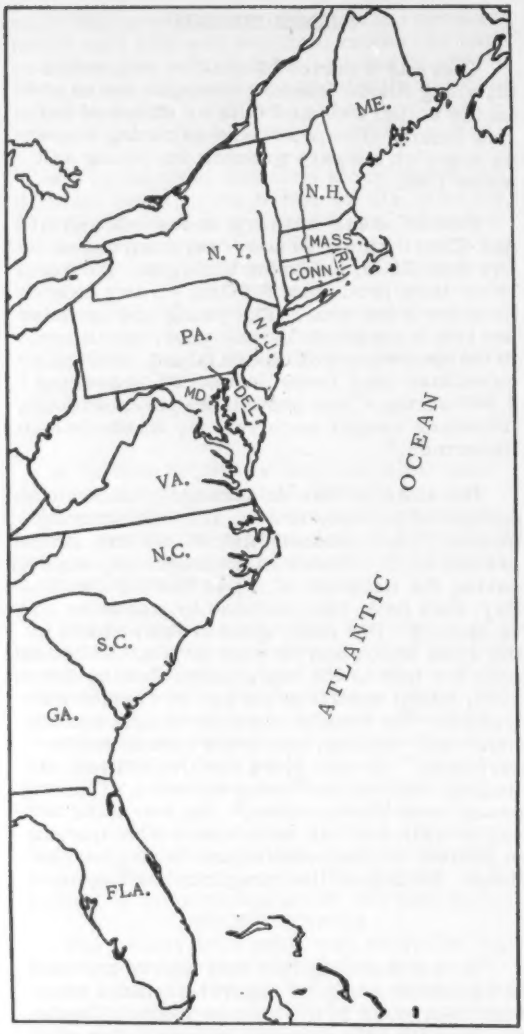
Two of these nursery areas--Green Hill and Charlestown Ponds--were surveyed by Dr. Saul Saila, a marine biologist. He found that they produced 215,710 young winter flounder in one year. The young are spawned and live in the ponds for one year, then move to the open waters off Rhode Island. Dr. Saila calculated that these two ponds--covering 2,000 acres--"can provide 25 percent of all flounders caught each year by Rhode Island fishermen."

The state is "low in acreage of salt marsh compared to many states, and this scarcity makes the remaining marsh all the more precious. . . . There is no longer any hope of saving the wetlands of upper Narragansett Bay; they have been doomed by intensive development. But many good areas remain in the state which can be kept fertile." The best hope for this is the Marshlands Zoning Act of 1965, which restricts the use of coastal wetlands for the benefit of public health, marine fisheries, wildlife, and other conservation purposes." It also gives the Department of Natural Resources "some measure of zoning power over the marshes." An extensive survey of wetlands has determined which areas to protect and priorities have been given to them. An acquisition program has begun.

CONNECTICUT

"It is a startling fact that nearly one-half of Connecticut's good coastal wetlands have been destroyed in the last 50 years. There now remain only about 20 square miles of good wetlands area. . . ." This loss jeopardizes salt water fish resources because, as in other states, most important salt water fish resources depend on wetlands and other parts of the estuary. The fish include striped bass, flounder, bluefish, scup, tautog, shad, and menhaden.

"The greatest threat to the estuaries today comes from dredging activities to make boat channels and marinas." The Board of Fisheries and Game favors public purchase to preserve marshes. "There is no state




control over the tidal marsh areas above mean high water." The Board now owns 3,500 acres of tidal marsh and is seeking funds to buy 7,500 more acres.

## NEW YORK

"The alarming conclusion of the most recent survey of Long Island's estuaries is that 29 percent of the marsh and shallow coastal habitat was 'obliterated' in just ten years, from 1954 to 1964." The report doubted that the remaining 30,600 acres of coastal marshland could be saved.

The state legislature had passed the "Long Island Wetland Bill" in 1959 providing funds up to 50 percent of development and 50 percent of maintenance to town- or county-owned lands dedicated to conservation. But Long Island communities "were slow to take advantage of its provisions."

A bright spot in a gray picture is the achievement over a 6-year period of a group of citizens in the Town of Hempstead. They have "so far saved a major portion of the town's rich and beautiful wetlands from ruin at the hands of developers." The Hempstead marshes support 60 species of fish. In 1966, the group persuaded the town to put aside 10,000 acres for conservation purposes. The action was taken in a joint program with the state under the Wetland Bill. The state will pay for the development and 50 percent of maintenance.

Besides encouraging conservation through the Wetland Bill, the state can do little to save privately owned wetlands. "The state has no control over wetlands in town, county, or private ownership."

Conservationists believe there is some chance of saving much of Long Island's remaining estuarine areas through state purchase. They point to the actions of New Jersey, Connecticut, Rhode Island, and other states.

"Hope is nearly exhausted" for Staten Island and Queens County. Over half their wetlands are gone and "the rest apparently will be gone in a short time." Long Island's north shore is being threatened by recreation development and gravel and sand mining.

## NEW JERSEY

"No Atlantic state has better or more varied salt water fishing than New Jersey. Nor does any state derive more economic or social value from its fisheries. . . . Already hard hit by pollution, New Jersey's fisheries are threatened further by physical disruption of valuable shoreline habitat." A report of the U. S. Bureau of Sport Fisheries and Wildlife says that the state's rich estuaries "are of great importance to fish and shellfish as spawning and/or nursery grounds."

Most of the state's valuable and popular fish depend on estuaries of sea coast and of Delaware Bay--striped bass, bluefish, fluke, weakfish, white perch, flounder, menhaden, and others.

In 1954-1964, the state lost 24,600 acres of coastal wetlands--about 9.6 percent of what it had in 1954. Landfill for housing, garbage dumps, industrial sites, and harbor and channel dredging were mainly responsible. Also, the quality of existing areas deteriorated--especially Hackensack Meadows and the shores of Raritan River and Bay--because of siltation, pollution, etc. These losses do not include 10,000 acres of southern New Jersey marshes diked in to produce salt hay. Diking interferes with the access of fishes to the marshes and the flow of nutrients to the sea.

New Jersey legally controls only state-owned wetlands. The state's major program to prevent loss of estuarine area is to buy as much coastal marshlands as possible. In present and planned purchases, the state and the U. S. together will own 150,000 acres of coastal marsh.

## DELAWARE

Although Delaware's rich coastal lowlands "have suffered almost every possible kind of disruption over the years... the total loss of estuarine habitat to date through man's maneuvers is not so great as in many other states. But unfortunately, the areas now being threatened are among the most valuable in Delaware for salt water fish."

The most extensive alteration of marshes came through extensive ditching for mosquito control.

Studies by the University of Delaware have shown that the state's estuarine areas are very fertile and able to support substantial marine life. For example, a study of Canary Creek Marsh showed that for each acre of marsh two-thirds of a ton of plant material produced each year is washed out of the marsh to fertilize estuarine area. The plant material becomes fine particles called detritus and feeds many shrimp on the shores of Delaware Bay. The shrimp then feed fluke, weakfish, and others. The detritus also produces Vitamin $B_{12}$, which is fed upon by oysters, mussels, crabs, and shrimp. Although the marsh has some year-round species, most are tidal migrants.

Beyond the marshes, in intertidal zone of beaches along the bayshore, are more rich areas producing baitfish (anchovy, killifish). The young of valuable species are abundant here too during their first year--young bluefish, striped bass, weakfish, flounder, croaker, menhaden, etc.

The University reports urge preservation of marshlands, particularly those in lower half of the state.

## MARYLAND

The booklet bases its Chesapeake Bay section, which describes the Maryland estuarine situation, on the 1961 writings of Dr. Romeo J. Mansueti.

Chesapeake Bay is one of the largest estuarine systems of the Middle Atlantic coast. It is an extremely important spawning, nursery, and feeding area for many game fishes. "In spite of all the changes wrought by man up to now, Chesapeake Bay has been remarkably resilient, and it may still be considered a relatively unspoiled region." Although its overall fertility remains good, "there have been permanent and devastating effects through sedimentation, pollution, wetland reclamation, and dams."

The greatest losses, by far, of wetland areas in Maryland have taken place along the Western Shore, the Bay's northern end, and south along Eastern Shore to Eastern Bay. These areas are being developed rapidly for homes and industry--and wetlands losses totaled nearly 14 percent during the past decade. As population increases, losses mount at a quicker rate. "A long term plan for the preservation of the more valuable wetlands is absolutely essential."

The state's wetlands are largely privately owned. However, there are vast shallower water areas below mean low tide, with a depth of six feet or less, which are state owned. "There appear to be adequate laws to insure that most publicly owned wetlands will not be destroyed indiscriminately." Their future and optimal use should be planned carefully. There are vast areas of privately owned wetlands, over which the state has no control, which are being lost at "an ever increasing rate." Jurisdiction over them rests with local governments--and the state should provide incentives to the former to preserve wetlands.

## VIRGINIA

The state has not suffered the serious estuarine damage of many states "but constant vigilance is needed." There are few important salt water fish that are not "critically tied to the estuarine zone for at least part of their lives." Striped bass, white perch, and shad spawn in fresh or nearly fresh water; the young of all 3 live in rivers or brackish upper estuaries. Weakfish, croaker, spot, flounder, bluefish, menhaden, and many lesser species spawn in open salt water--but their young move into shallow areas for feeding and protection during the critical first year.

"Increasing attention must be paid to large-scale engineering projects to protect the valuable estuarine resources of Virginia." The changes in the estuarine area from Back Bay down to Currituck Sound make it difficult to classify the area as fresh or brackish water. Action must be taken if these waters "are to remain as productive fishing area for striped bass, white perch, and for fresh water species such as large-mouth bass and yellow perch; and as nursery area for salt water fish such as menhaden, croaker, and spot."

## NORTH CAROLINA

"North Carolina is blessed with an extraordinary abundance of coastal life. Large salt water fisheries, both sport and commercial, and waterfowl resources as well depend on the state's estuarine zone. The shallow sounds, marshes, and tidal rivers behind the outer banks provide a mecca for estuarine life. The outpourings of these shallow areas into the sea provide nourishment for the marine fishes along the outer coast."

The shallow water areas behind the outer banks appear also to be major nursery grounds for many migratory species. Flounder (fluke) populations along the whole coast north to Massachusetts appear to originate in North Carolina estuaries. This may be true too for croakers and weakfish, though they travel shorter distances.

### Dangers Threaten

But dangers exist. The recent Intracoastal Waterway dredging operations in Brunswick County caused heavy losses of oysters under cultivation on private and public bottoms. Estuarine mining for phosphate from the bottoms of the Pamlico River are a threat. The diking off of large marsh areas for mosquito control impoundments "must be very damaging to salt water fish resources." And land developers are threatening the state's large undisturbed natural estuarine areas.

David A. Adams, the state's Fisheries Commissioner, states: "The single most important cause of habitat change and destruction in North Carolina, as well as most other coastal states, is the creating and maintaining of navigational channels and harbors, and the associated reckless and uncontrolled disposal of dredge material." He cites another problem: "Private citizens don't know how much of their alleged holdings of these habitats are valid and neither does the State. Until we have an adequate inventory of this resource, we can't possibly plan for its long-term utilization."

## SOUTH CAROLINA

Dr. Robert Lunz, State Director of Commercial Fisheries, referring to work done by Bears Bluff Laboratory, said: "It has been shown that the basic caloric energy released by an acre of marshland is about ten times that of acre of good wheat. This energy from the salt marsh goes into production of sports and commercial marine fish and fisheries. It is now established that 98 percent of South Carolina's fish and fisheries is directly connected, in some manner, to marshlands. The stability of the State's crab crop, shrimp harvest, and oyster production rests squarely on marshlands. Unwise exploitation of marshland must be stopped."

Water control projects are a constant threat to the estuaries.

## GEORGIA

"Georgia's extensive salt marshes make her estuarine zone among the most productive littoral areas of the Atlantic Coast. . . . About 45 percent of the plant material formed in the marshes is carried off to fertilize adjacent bays and coastal waters." This material supports marine life--"sea trout, flounder, drum, whiting, croaker, mullet, spot, tarpon, shad, striped bass, sheepshead, cobia, shrimp, crabs, and oysters."

Conservationists believe that long-term planning should be done now. Dr. Eugene P. Odum of the University of Georgia, says:

"while we push ahead with research (into estuaries) it is equally urgent that the idea of landscape zoning become generally accepted."

One imminent threat to estuaries is water level control operations in the coastal area. This "endangers salt marshes by cutting them off from the bays with dikes and altering natural water flow patterns." Another threat comes from navigation improvement activities that have "complex ecological ramifications." This is shown by attempts to control the silt buildup in the Savannah waterways by using an "involved hydraulic theory" as an alternative to diverting the fresh water river flow completely away from the harbor. "Loss of fresh water from diversion would alter adversely the whole ecology of the Savannah River estuary, causing pollution problems and detrimental effects on fish and wildlife... ."

FLORIDA

"Nowhere in the country is salt water fishing more appreciated or more important economically than in Florida. Yet ignorance of ecological consequences of shore projects, short-sighted public works, and uncontrolled fast-buck schemes have probably had a more ruinous effect on coastal resources in Florida than in any other state. No Atlantic state faces more serious problems in littoral conservation... ."

Losses due to shorefront development "appear to have significantly affected coastal living resources." But in 1964, the state strengthened its controls over bulkhead lines, submerged land sales, and dredge permits. In 1965, Florida created the first in a series of large marine preserves.

Dredge-and-fill projects have caused much damage to coastal resources. A notorious example is Lake Worth, long a productive brackish water lagoon. Fish catches have declined drastically. This is blamed on physical changes in environment from dredging and from muck materials from the Everglades brought down by the Palm Beach Canal. Canal building produces ecological disruption and is another growing threat to salt water and inland fishing.

Still A Chance

Figures for 1961 showed that Florida's coastline of over 8,000 miles had been developed 20 percent. "Changing economics will require that much of this be re-developed." And this will provide another chance to regulate coastal development soundly.

One of the most promising precedents in conservation is the setting up, in 1966, of a 10,000-acre marine preserve in the Estero Bay, which includes the northwest fork of Loxahatchee River (between Ft. Myers Beach and the Lee Country mainland). At least 6 other outstanding marine areas are being considered for inclusion in a system of marine preserves under the management of the Florida Outdoor Recreational Development Council.

## 1967 Shrimp Catch Expected to Set Record

The U. S. shrimp catch in 1967 probably will exceed the previous record of 160 million pounds (heads-off weight) taken in 1954, according to BCF. As a result, shrimp prices are much lower than a year ago. U. S. fishermen capture most of their shrimp along the Gulf Coast from Florida to Texas.

The U. S. is the world's leading shrimp consumer--accounting for about one-third of the world catch.

## Sea Scallop Supplies Drop, Prices Rise

Supplies of sea scallops this year are nearly 40 percent less than a year ago. Their abundance apparently has declined to levels before the large catches of the late 1950s and 1960s.

The decline has had a self-regulating effect on the New England scallop fleet. Thirty scallop boats now operate out of New Bedford. There were 34 at the start of 1967 and 38 at this same time last year. In the early 1960s, the New Bedford fleet had 70 scallop vessels. Substantially higher exvessel prices this year have compensated for the lower catches. Fishermen are now receiving about 50 percent more than a year ago. Consumption has dropped a third from last year because of higher

prices due to lower catches and a marked decline in supplies. Retail prices for frozen sea scallops in mid-August were at an all-time high. There seems little likelihood of price weakness for the fall and winter. Institutional users may find current shrimp prices more favorable than those of scallops--and substitute more shrimp.

## Puerto Rican Fisheries Development Aided by U. S. Funds

Scientists of the University of Miami Institute of Marine Sciences are helping the Commonwealth of Puerto Rico develop its commercial fisheries. Dr. C. P. Idyll, Chairman of the Institute's Division of Fishery Sciences, is directing an analysis of current commercial fishery operations in the Commonwealth to establish guidelines for the industry's development.

Puerto Rico became eligible for matching funds from the U. S. under the Commercial Fisheries Research and Development Act. The Act was designed to help the individual states enlarge and maintain fishing resources capable of yielding maximum production.

The project's principal investigator said: "We want to find out the true value of the current Puertio Rican fishing industry, as well as the seasons and areas in which the fish are caught, and to used these basic facts for planning purposes in order to assign priorities for the future benefit of the Commonwealth's fisheries."

Achievements So Far

To date, the Institute's investigators have helped Puerto Rico buy and equip a 37-foot boat and design another 23-footer for exploratory and demonstration purposes. To support the vessels, they have provided a mobile shore base, which includes an air-conditioned van with self-contained ice-making equipment and insulated ice storage. They have advised in the selection of a site for a fisheries laboratory the Commonwealth proposes to build. They have recommended qualifications and duties of personnel in the development program.

The next step is a statistical study of present fishing practices and yields. A system for collecting these data was developed by interviews with fishermen and buyers. The fishermen catch a wide variety of fish species. These are handled and marketed as classes rather than species, but their principal landings are in snapper and grouper families. There also is substantial production of spiny lobster.

The Institute of Marine Sciences group hopes to help enlarge the fisheries program and have it operate at maximum efficiency--not only for economic benefits but for dietary values. (Institute of Marine Sciences, University of Miami, August 10.)

## American Samoa Tuna Price Set

The prolonged price negotiations between Japanese suppliers and U. S. packers in American Samoa for August tuna deliveries finally was settled on September 7. The prices per short ton set by the new, 3-month agreement, are: August--same as July prices (for forzen tuna: albacore $370, yellowfin $300, bigeyed $185 a short ton); September--up $2.50 a ton for albacore and $5 a ton for yellowfin; October--same as September prices. ("Suisan Tsuεhin," Sept. 11.)

## Packaged-Type Small Fish-Meal Plants Made by Coast Firm

A line of packaged-type, small, fish-meal plants has been introduced by a Los Angeles, Calif., firm. The firm has been manufacturing fish-meal plants for more than 50 years. The plants are complete, self-contained units. The currently popular Model 22 processes one ton of raw material per hour producing whole fish meal. The units are built for continuous operation. They contain a cooker, drainer, press, solids screen, dryer, meal grinder, sacking unit, and motors, piping wiring, switches and controls. The components are assembled as a complete package on a single-base frame.

The firm's vice president of sales announced that the plants have been developed for canneries, processing plants, and fisheries having limited capacities--either shore or floating installations--for both salt-water and fresh-water operators. He said the plants were "completely self-contained. . . . These compact fish-meal plants incorporate the most modern technology for producing high quality whole fish meal with full recovery of all protein available in the raw material. The process is accomplished without producing any waste water effluent, thus eliminating the question of pollution in inland waters."

Recovers and Uses Stickwater

One of the unit's unique features is the recovery and utilization of stickwater entirely within the dryer of the basic unit. This eliminates the need for a separate stickwater evaporator and greatly simplifies the equipment installation and operation.

The official also said: "One of our customers who is processing lake fish had a costly problem in disposing of wastes from his filleting plant. By installing our fish meal plant, he turned a costly nuisance into a handsome profit. So far, the plants have successfully processed a wide variety of material, including ribbon fish, anchovies, mackerel, and miscellaneous varieties of trash fish caught by shrimpers; as well as wastes from packing operations of tuna, mackerel, crab, shrimp, and even fresh-water carp." (The "Fishermen's News," September.)

## In Brief

CANNED KING CRAB STOCKS

On September 1, canners' stocks (sold and unsold) in the U. S. of canned king crab totaled 49,350 cases (basis 48/½'s)--6,988 cases more than on August 1. The September 1 stocks were 75,611 actual cases of fancy pack (71,636 cases were 24/½'s) and 20,452 actual cases of chunk pack (18,696 cases were 24/½'s).

* * *

MENHADEN CATCH

Total catch of menhaden in the U. S. during August was 219.4 million pounds, compared with about 183.3 million pounds during August 1966--an increase of 19.7 percent.

* * *

SHRIMP IMPORTS

U. S. shrimp (fresh, frozen, canned, and dried) imports from all sources in August 1967 were 11 million pounds, compared with 11.3 million pounds for the same month in 1966. Imports during August 1967 of fresh or frozen heads-off shrimp (shells-on) amounted to 6.5 million pounds; peeled and deveined, 3.3 million pounds; frozen breaded (raw or cooked) 1,456 pounds; and other types of shrimp products (some dried and canned) 1.3 million pounds.

Mexico shipped 1.9 million pounds during August 1967 (compared with 2.1 million pounds in August 1966) consisting of 487,820 pounds of fresh or frozen heads-off shrimp (shells-on); peeled and deveined, 1.3 million pounds; and other types of shrimp products, 145,852 pounds.

* * *

BREADED SHRIMP PRODUCTION

During second quarter of 1967, production of breaded shrimp in the U. S. totaled about 18.9 million pounds--a decrease of about 1.2 million pounds, or 6.1 percent, from April-June 1966.

The Inland and Gulf States produced 11.4 million pounds, Atlantic States 5.6 million pounds, and Pacific States 2 million pounds.

# OCEANOGRAPHY

## Scripps Announces Central North Pacific Study

A pilot program to investigate the vast central North Pacific was announced in September by the University of California, San Diego's Scripps Institution of Oceanography and the Office of Naval Research (ONR). It is designed to obtain knowledge of ocean-atmosphere interaction and to improve long-range oceanographic and meteorological forecasting.

Dr. William A. Nierenberg, director of Scripps Institution, said: "A four-million-square-mile region extending some 1,000 miles south of the Aleutian Islands comprises the area in which we will initiate observations and study of physical changes in the upper ocean layers. If the results of the pilot study warrant, we will plan to carry out a long-range study. Included among the beneficiaries of a long-range study will be Navy vessels and aircraft, U. S. Weather Bureau forecasters, the U. S. Bureau of Commercial Fisheries, commercial fishermen, farmers, ship operators, and UNESCO's World Weather Watch, which is expected to become operational in the early 1970's."

The study's principal investigator is John D. Isaacs, professor of oceanography at Scripps and director of its Marine Life Research Group.

To Install Deep-Moored Stations

To conduct this initial study, Scripps scientists and engineers will install "two clusters of four, deep-moored, unmanned, catamaran-type, floating instrument stations north and northwest of Hawaii." In the center of each cluster will be a 40-foot Monster buoy. The buoy, developed for the Office of Naval Research by the Convair Division of General Dynamics, already has been tested extensively off the Florida coast and Bermuda.

The Scripps-developed instrumented stations, moored in water 12,000 to 18,000 feet deep, will record surface wind speeds and directions and water temperatures at depths to 1,000 or 1,500 feet. A separate station in each cluster will measure ocean currents. The moored stations also will record barometric pressures, solar radiation, and relative humidity.

"The two Convair-developed stations will record water temperature, surface wind, speed, and direction; barometric pressure, precipitation, relative humidity, solar radiation, and wave height." They will telemeter data for immediate use by Government scientists. The Convair-ONR Monster buoy Alpha, anchored off La Jolla, Calif., in early June, was scheduled to undergo long-range telemetry tests.

Cooperating with Scripps and ONR in the study are the Weather Bureau, BCF, the Navy's Fleet Numerical Weather Facility, Monterey, Calif., the U. S. Coast Guard, NASA, and universities.

Knowledge About Surface Waters Sought

Prof. Isaacs said that one of oceanography's critical problems is to determine the nature and causes of the large-scale persistent shifts in temperature of the surface water of oceans. He explained:

"We have long been aware of historical and continuing fluctuations in conditions along most coasts, but it has been only in the last ten years that we have realized that these local changes are only a part of very extensive changes involving entire oceanic regions.

"The immense scale of these changes was revealed by the Bureau of Commercial Fisheries in studies of sea surface temperatures from ship reports.

"The existence of these changes is readily apparent from vessel measurements, but the nature of the processes involved cannot be documented by any feasible ship survey, so we are turning to an array of these successfully tested, deep-moored platforms bearing continuous recording instruments at a number of depths to give us the data we need."

## Map Published of Seabed off San Diego, Calif.

A detailed map of the sea bottom off the California coast near San Diego has been published by Coast and Geodetic Survey. The bathymetric map, covering about 5,000 square miles, includes the area extending seaward up

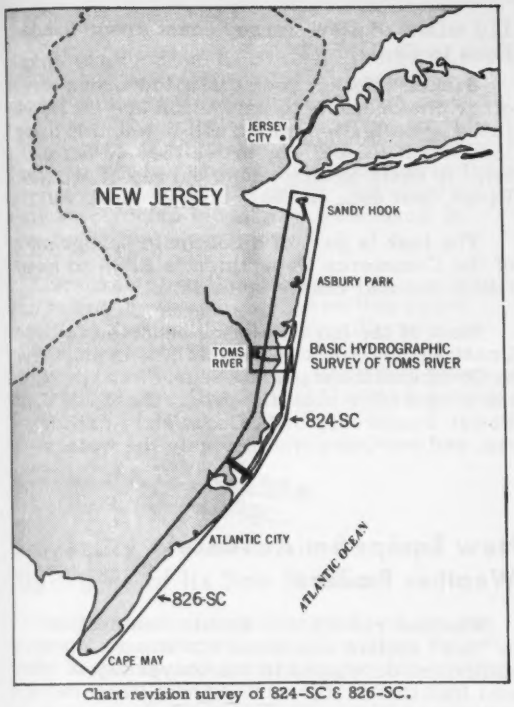



Chart revision survey of 824-SC & 826-SC.

to 50 nautical miles from Huntington Beach, Calif., to Punta Sal Si Puedes, Mexico.

The new map is third in a topographic series of the sea bottom that ultimately will cover the entire west coast. The first covered the area immediately northwest to Santa Barbara; the second extended from Cape San Martin in the north to Point Conception and Santa Rosa Island in the south. Similar maps are being made by the Commerce Department agency of seabeds off the Gulf of Mexico and Atlantic coasts.

Aid Continental Shelf Study

The maps are designed to aid Federal, state, and industrial interests in exploring and developing the potentially vast resources of the Continental Shelf in and under the ocean. Economic development of these resources depends heavily on bottom topographic maps; few exist now.

For the first time, the sea floor off San Diego is detailed by depth contours, from a few feet off the coast, to 6,532 feet at the map's most seaward point.

Prominent underwater feature shown include San Clemente Basin; La Jolla Canyon; Coronada Canyon and Escarpment; San Diego Trough; and Lasuen Knoll. Also included are the Mexican islands of Los Coronados.

Hydrographic surveys dating from 1922 to 1944 were used to produce the new map. It includes an evaluation of hydrographic survey coverage and an index showing survey limits. Undersea features are emphasized in gradient colors.

Designated 1206N-16, the map may be purchased for 50 cents from the Coast and Geodetic Survey (attn C44), Washington Science Center, Rockville, Md. 20852, or from chart distribution centers of the Coast and Geodetic Survey at 121 Customhouse, San Francisco, Calif. 94126, and 602 Federal Office Bldg., 90 Church St., New York, N. Y. 10007.

## Seabed of Maine's Gulf Studied

A gravity survey of the Gulf of Maine's seabed was conducted by the Coast and Geodetic Survey's "Discoverer," September 10-25. It included part of Georges Bank. The survey is a key step in determining whether oil deposits exist off the New England coast.

Scientists of the Commerce Department agency were trying to ascertain the field strength of gravity of the seabed off the coasts of Maine, New Hampshire, and Massachusetts in an area extending from Cape Cod to the Bay of Fundy for about 200 miles out to sea.

Dr. Hyman Orlin, a Coast Survey geodesist who headed the project, explained:

"Seismic and magnetic surveys have already been made of the bottom of the Gulf of Maine. When the gravity data is added to these findings, a determination can then be made as to the geological structure of the bottom. This will provide a better idea as to whether oil deposits may exist there."

Survey Part of Large Program

The Gulf of Maine gravity survey was part of an extensive program underway by the Coast and Geodetic Survey to accelerate the economic development of the continental

shelf. This vast submerged area embraces about 800,000 acres off U. S. shores.

The program produces topographic maps of the seabottom. Bathymetric maps covering the bottom of the Gulf of Maine, the mid-Atlantic Coast, Southern California, and the Aleutian Islands already have been issued.

Dr. Orlin emphasized that the gravity, seismic, and magnetic surveys, supplemented by bathymetric maps, will speed the search for solid minerals, as well as oil, on the continental shelf.

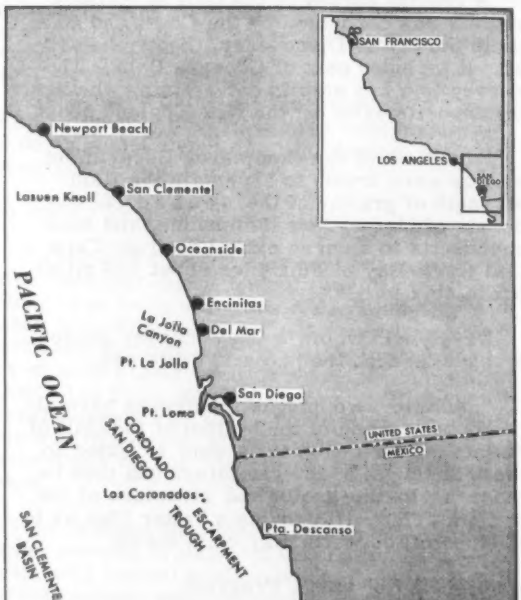
## Navigational Hazards Along New Jersey Coast Being Studied

The Coast and Geodetic Survey (CGS) is conducting a 3-month hydrographic investigation of over 100 reported navigational hazards in inlets, bays, and harbors along the 110 miles of New Jersey coast from Sandy Hook to Cape May.

Sunken wrecks, rocks, shallow areas, and other obstructions to navigation are included in the investigation, which will determine their location and depth--or prove they do not exist. A basic hydrographic survey of Toms River, last done in 1935, also is under way.

The task is part of a continuing program of the Commerce Department's ESSA to keep C&GS nautical charts up to date.

Most of the hazards were reported to the Coast Survey's Rockville, Md., headquarters by Government and private sources and through the cooperative charting programs of the U. S. Power Squadrons, U. S. Coast and Auxiliaries, and mariners who navigate the waters.




New bathymetric map (1206 N-16) issued by Coast & Geodetic Survey-ESSA covers seabottom off the coast of Southern California and Mexico.

## New Equipment Advances Weather Radars

Weather radars will enable weathermen to "see" distant electrical storms with new equipment developed in the University of Miami Institute of Marine Sciences' (IMS) radar meteorological laboratory. The equipment is known as a Sferics-to-Radar Data Convertor. Sferics is the technical term for radio noise produced by electrical discharges in a cloud--whether or not they are great enough to produce visible lightning strokes.

At present, weather radars display areas of rain but observers have no sure means of identifying active thunderstorms. Instead, they rely on their own experience to interpret the display. Although a few sferics sensors are in use, they are not coupled to a weather radar to provide the two items of information on one display.

### Rain and Electrical Activity Seen

The new convertor, developed under contract from the Geophysics Branch, Office of Naval Research, adapts signals from a Litton Systems, Inc., SPARSA sferics sensor in the format of vectors displayed at the same time on the radar screen. Thus, the observer can see which areas of rain are accompanied by electrical activity; from the length of the vector, he can judge its severity. This dis-

play is made on the center of the radar screen, in the area usually dominated by ground clutter from nearby buildings, terrain, etc. This clutter is removed, leaving a clear area in which the vectors are shown. These increase in length in proportion to the strength of electrical activity. All solid-state electronics techniques were used in developing the convertor.

The director of the IMS radar laboratory, who heads the project, believes this added capability for weather radars will prove invaluable to forecasters, for pilot briefings and severe storm warnings, and other areas of meteorology. (Institute of Marine Sciences, University of Miami, Fla., Sept. 8.)

## University of California Reports Highlights of Its Sea Studies

"If the current annual catch from the sea were only quadrupled--to 200 million tons--there would be enough fish to provide protein for the six billion people expected on the earth by the year 2000." The writers of statement--in a special report ("Food From The Sea") to the Board of Regents of the University of California--believe it can be done. They say the oceanographer "knows that the supply of annual protein can be increased ten times with more efficient harvesting of the sea. But he also knows that this increase must await better charting of when and where marine life is, and that to enjoy its potential fully marine hunters must be changed into marine ranchers."

The report discusses the scientific search for food in the sea by the University of California and especially its Scripps Institution of Oceanography. There is urgent need to take more animal protein from the sea's vast storehouse. "Already, 500 million humans suffer from malnutrition for lack of protein, a more frequent cause of death than any disease. And those who suffer from chronic protein starvation are often maimed for life."

What Scripps Is Doing

Several problems under study by Scripps and other University of California campuses are:

The Chain of Life: Dr. J. D. H. Strickland heads the Scripps research group seeking better understanding of the chain of life. Dr. Strickland says the oceanographer "should learn where and when edible sea life may be found in vast areas of the ocean, and how to maintain the supply for an unending harvest." He must learn the pathway of energy in the food chain, how to measure the sea's "standing" stock, and the reproductive rates and growth throughout the system.

The job is very difficult, Strickland says. He notes, however, that scientists are entering an age of automated, sea going analysis. They can record basic facts continuously: temperature, phosphate, oxygen, nitrite, silicate, chlorophyll, and the distribution and size of particles.

Dr. Strickland is searching for artificial ways to recreate the sea's conditions under scientific controls.

Finding the Fish: Until 1950, the adventurous fishermen discovered new fishing grounds. They were followed by the oceanographers.

The University of California's studies of life in the California Current has made the current "one of the best known segments of the sea." Intensive studies were begun following the disappearance of the sardine, once the major catch for California fishermen. The search led to great quantities of Pacific hake and the anchovy, the sardine's competitor.

Conserving the Species: While Scripps scientists seek new areas to fish, they worry about overfishing certain species. Walter R. Schmitt estimates that 90 percent of the world's fishing industry involves a dozen fish: herring, anchovy, menhaden, cod, hake, haddock, rockfish, mullet, tuna, mackerel, salmon, and flounder.

Scripps studies of the anchovy off Peru disclosed that the fishery had reached its maximum annual rate. The Peruvian government has set conservation regulations based partly on these studies.

## Foreign Fishing Off U. S. Coasts in August

IN NORTHWEST ATLANTIC

Soviet: Fog and haze blanketed the Georges Bank area during much of August, restricting aerial observations and limiting somewhat the assessment of Soviet fishing.

The number of vessels decreased sharply from 150 early in August to about 60 by month's end--a normal decrease this time of year. Smaller side trawlers return home after 5 or more months of extensive fishing. Surprisingly, only 10 stern trawlers fished on Georges Bank in recent months.

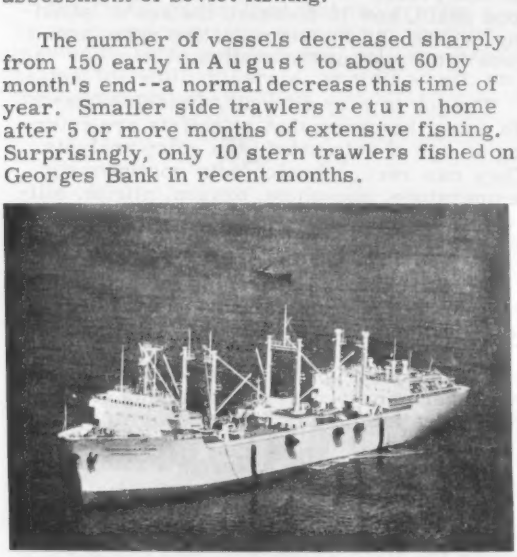


Fig. 1 - Soviet factory base ship, "Leningradskaya Slava," anchored 170 miles east of Nantucket Island, Mass., on June 7, 1967. In the background, a medium side trawler approaches to unload her catch.

Fig. 2 - Large catch of herring on board Soviet medium side trawler fishing Georges Bank area. (Photos: C. L. Philbrook)

Mostly from mid-August on, 74 individual vessels were sighted and identified as 7 factory stern trawlers, 17 medium refrigerated side trawlers (11 SRTR's, 6 SRTM's), 44 medium side trawlers (SRT's) and 3 factory base ships (see photo No. 1), one refrigerated fish transport, one tanker, and one repair tug. In July, an estimated 200 vessels were reported.

Early in August, the fleet worked in two areas: about 125 vessels were along the southeast slopes of Georges Bank and catches were believed to be herring and whiting. In a small area 25-30 miles south of Nantucket Island, about 25 vessels fished mostly whiting and some red hake.

By mid-month, the fleet, already reduced to 60-70 vessels, concentrated in a 25-mile area on southeast part of Georges Bank (Corsair Canyon) fishing at 40 to 60 fathoms. Heavy-to-moderate catches on deck were identified as mainly herring (see photo 2).

By month's end, the same fleet shifted to the inner shoals along Banks' northern edge. Herring in moderate quantity was principal catch.

Other Nations Fish Georges Bank

Late in August, in addition to Soviet vessels on Georges Bank, there were vessels from Poland, West Germany, East Germany, and Romania.

Poland: Two freezer stern trawlers and 8 large side trawlers were observed fishing among the Soviet fleets. Catches appeared to be herring. (About 16 Polish trawlers were reported on Georges Bank in June.)

East German: Five freezer stern trawlers were sighted among the above vessels. At least one fished intermittently on the Banks in recent weeks, apparently searching for fish.

West German: Five stern trawlers arrived late in August to fish for herring--believed the first instance of this many vessels operating at one time. (In the past years, 1 or 2 were reported occasionally but rarely sighted during surveillance flights.)

Romania: One stern trawler, "Galati," was observed on Georges Bank in mid-August but not later in month.

IN THE GULF OF MEXICO

Cuban: In June and early July, most vessels concentrated off Bahama Islands and north Cuban coast. However, by July's end and during early August, the fleets fanned out throughout the Gulf of Mexico. Their largest concentration, up to 40 vessels, was on Campeche banks off the Yucatan Peninsula; individual units were spread along slope of Continental Shelf (in waters 200-1,000 fathoms deep) of Mexican and U. S. coasts.

In first week of July, the U. S. Coast Guard sighted 6 vessels about 120-150 miles south-southwest of mouth of Mississippi River between edge of Continental Shelf and 1,000-fathom curve. They were probably long-lining for tuna and sharks. Another 3 long-liners were sighted on July 19 in about the same area. This was first time in several years that a sizable number of vessels operated in Northern Gulf of Mexico. One or two years ago, Soviet research vessels were sighted in the same general area.

Most of these vessels remained 50-200 miles from shore (depending on contour of Continental Shelf). On July 30, the "Liseta" and "Aquaji" were sighted off the Louisiana coast, 27° 5' N. and 92° 45' W. No catch information is available. (See "Louisiana," p. 20).

Soviet: Only individual vessels were sighted passing through Florida Straits to or from South American fishing grounds.

OFF CALIFORNIA

Soviet: Throughout August, up to 10 vessels fished off California. On August 4, four large stern factory trawlers were sighted 17 miles northwest of Point Reyes (north of San Francisco). On August 28, one stern trawler and a supply vessel were sighted about 14 miles west of Pigeon Point (south of San Francisco). No catch information is available.

OFF PACIFIC NORTHWEST

Japanese: During August, 3 Japanese stern trawlers operated here, working 50 to 60 miles offshore. Pacific Ocean perch were observed on one vessel.

Soviet: Extensive fog off Washington and Oregon made air and sea surveillance difficult, sometimes impossible. Early in month, about 70 fishing and support vessels fished off Pacific Northwest, about the same as July. Complete data are unavailable for next two weeks, but at month's end total decreased to about 50. (This compares with 107 in early August 1966 and 82 late that month.)

Notably absent were large stern trawlers; only a few were sighted during last week. Most vessels were medium side trawlers.

Early in month, the Soviet Fleet operated in 5 separate groups off Washington, between Point Grenville and Cape Disappointment; only 2 were sighted off Oregon. During month, however, more vessels drifted south, and 13 were sighted fishing off Oregon by month's end.

Information on Soviet landings is scant. It appears that most catches were Pacific hake, with incidental catch of rockfish species. All available data indicated that total catch of hake this year will not reach 1966's 130,000 metric tons.

The fleet was supported by 5-6 research and exploratory vessels throughout the month.

OFF ALASKA

Japanese: With end of her North Pacific whaling, number of fishing vessels off Alaska decreased from about 200 in early August to about 175 by month's end.

In early August, 8 Japanese trawlers fished for Pacific ocean perch in Gulf of Alaska--4 vessels on Portlock Bank, 3 near Middleton Island, and 1 on Yakutat grounds. By mid-month, number of trawlers increased to 9, as one transferred to Gulf from eastern Bering Sea. Effort shifted during mid-month when Middleton Island area was abandoned. Three vessels continued on Portlock Bank, 2 trawlers resumed operations on Albatross Bank, 1 trawler continued fishing on Yakutat grounds, and 3 trawlers began fishing off southeastern Alaska coast. By end of August, the effort in Gulf perch fishery had increased to 13 vessels--5 trawlers off coast of southeastern Alaska, 1 on Yakutat grounds, 3 on Portlock Bank, 3 on Albatross Bank, and 1 near Chirikof Island. The trawlers fishing in Gulf of Alaska were serviced intermittently by refrigerated transport and cargo ships.

During first-half August, about 9 trawlers, periodically serviced by refrigerated transports, fished for perch along Aleutian Islands Chain: 8 along central Aleutians and 1 south of western Aletuians. About mid-month, a few Aleutian Islands trawlers transferred to

Gulf of Alaska. However, the arrival of new trawlers along Aleutians shortly thereafter increased number to about 10 trawlers. In late August, perch operations like Soviets', became more dispersed. One trawler was south of Fox Islands in eastern Aleutians, 4 were south of central Aleutians, and 5 (supported by two reefers) were fishing south of western Aleutians.

In early August, 4 trawlers fished for perch along 100-fathom curve from north of Unimak Pass to northwest of Pribilof Islands in eastern Bering Sea. By late August, 2 of these had transferred to Gulf of Alaska; it is believed the other two continued fishing for perch near Pribilofs.

One small factory trawler remained active on shrimp grounds near the Trinity Islands, off southwest Kodiak Island, throughout month.

Throughout August, 5 fish meal and oil fleets--5 factoryships accompanied by 105 trawlers--continued operations in eastern Bering Sea and northwest of Pribilofs in central Bering Sea. In early August, 2 fleets were on Bristol Bay "flats" east of Pribilofs, 2 fleets were along 100-fathom curve northwest of Pribilofs, and 1 fleet was just north of Fox Islands in eastern Aleutians. About mid-month, one of the fleets from northwest of Pribilofs moved southward along 100-fathom curve to just north of Fox Islands. The disposition of the remaining 4 fleets remained the same as above. By month's end, the area north of Fox Islands had been abandoned. Four fleets were located on Bristol Bay "flats" and 1 just northwest of Pribilofs.

Throughout August, the Japanese tangle-net fishery in eastern Bering Sea--2 factoryships and 10 net-setting trawlers--remained centered on Bristol Bay "flats," about 100 miles north of Unimak Island.

Two trawlers continued experimental pot fishing for crab just north of Unimak Island. Both had been operating since late April and did not end operations in July. Catches consist entirely of tanner crab which are frozen aboard the two trawlers and transported to Japan by refrigerated transport vessels.

Four long-liners fishing for sablefish were reported in Alaskan area during August--2 (1 near Middleton Island in central Gulf and 1 off Fox Islands in eastern Aleutians) were active during first week, then, apparently, returned home. The remaining 2 vessels were off the 100-fathom curve in western Gulf about mid-month; it is believed they returned to Japan by late August.

A stern trawler was seized on July 16 by the U. S. Coast Guard for fishing within the U. S. 3-mile territorial waters off Aleutian Islands. The vessel was radar-tracked for one hour while fishing near Adak, Alaska. The captain pleaded no contest and was fined $5,000 by the U. S. District Court in Anchorage. The Coast Guard later escorted the vessel out of U. S. waters.

Soviet: The number of fishing and support vessels decreased from about 50 in early August to about 40 at month's end. This compares with about 40 vessels off Alaska during August 1966.

Pacific ocean perch fishing in Gulf of Alaska remained at low level. Early in month, one SRTM (medium freezer trawler) was active off southeastern Alaska, one BMRT (stern factory trawler) fished on the Yakutat grounds, and one BMRT operated along 100-fathom curve in western Gulf. By mid-month, there were no vessels in the western Gulf; by end of August, only one BMRT remained in Gulf, fishing Yakutat grounds.

Soviet perch fishing was mostly along Aleutian Islands; about 12 vessels were active throughout the month.

Early in August, 9 BMRT's and 1 SRTM, supported by 1 reefer, were fishing off Seguam and Amukta Islands in central Aleutians, and two BMRT's fished for perch along Near Islands in western Aleutians.

By mid-August, operations had become more scattered along Aleutians. Two BMRT's and 1 SRTM were fishing for perch along Fox Islands in eastern Aleutians, 4 BMRT's supported by a reefer remained in the Seguam-Amukta Islands area, 1 BMRT was north of Andreanof Islands, 2 BMRT's and a reefer were active near the Buldir Island, and 1 BMRT and a SRTM were fishing along Near Islands. No perch catch information is available.

About mid-month, 1 BMRT and 1 SRTM were reported along 100-fathom curve near Pribilof Islands. Those vessels were believed fishing for perch and remained through rest of August.

In early August, the deep-water trawl fishery north of Fox Islands was conducted by 10 SRTM's and 1 BMRT catching flatfish and sablefish. By mid-month, there were 5 SRTM's and one BMRT. By month's end, this fishery was ended.

Whaling fleets generally remained well offshore. During early August, one fleet--a factoryship and about 12 whale killer vessels--was just north of Attu Island in western Aleutians. It is believed another fleet was also fishing along Aleutian chain.

About mid-month, one fleet was reported near Pribilofs and one fleet was believed located south of Rat Islands in western Aleutians. Two fleets were believed operating along Aleutians at month's end.

SEIZURE OF SOVIET VESSEL

On August 3, U. S. Coast Guard (USCG) patrol cutter "Avoyel" observed a Soviet medium freezer trawler (probably fishing for ocean perch) hauling gear about 10 miles off Akutan Island in Aleutians (54° 22' N. and 166° 7' W.). The vessel (SRTM-8457 of Far Eastern Fisheries Administration) is the one seized on March 22 for fishing within the U. S. 12-mile contiguous fishery zone off Alaska (her captain was fined $10,000). The USCG directed vessel to heave to, but the SRTM headed full speed towards international waters. The vessel was overtaken at about 13.5 miles offshore and boarded for violating 12-mile fishery zone. The USCG 17th District directed Avoyel's captain to seize vessel and tow it to Dutch Harbor on Unimak Island.

The U. S. Government dismissed illegal fishing charges against captain of SRTM-8457 and announced out-of-court settlement of Admiralty suit against vessel's gear.

U. S. Attorney McVeigh and Soviet attorneys agreed to $20,000 settlement to be paid by the Soviets to avoid Admiralty suit trial.

According to U. S. Coast Guard, Soviet captain was flown out of Anchorage on August 15 aboard Coast Guard plane to Dutch Harbor, where he rejoined his crew and vessel. Immediately thereafter, the vessel was escorted out of U. S. fisheries zone by a Coast Guard cutter.

FISH HEARING LIKENED TO HUMAN SMELL

A fish is in about the same predicament as a man trying to determine the source of an odor as far as telling the location of a sound source is concerned, the Acoustical Society of America meeting in New York was told by Prof. Willem van Bergeijk of the Center for Neural Sciences at Indiana University. Because humans have only one nose, the only way they can detect the direction of a smell is by "sniffing it out," trying here and there until stumbling upon the source. It is believed fish have the same problem locating the direction of a sound since fish have only one middle ear.

Fish can locate a sound source if they are close to it, but they do this through their lateral line (tiny sensory buds spread over the body) which is sensitive not to sound but to the small water currents near the sound source, such as those caused by a wriggling worm. (Reprinted, with permission from "Science News," weekly summary of current science, c 1966 by Science Service, Inc.)

# STATES

## Alaska

13-MAN TRADE MISSION
VISITS JAPAN

A 13-man Alaska trade mission, headed by Governor Walter J. Hickel, visited Japan early in September to talk with industry and business leaders. Gov. Hickel indicated his desire for Japanese participation in the exploration and cooperative development of Alaska's unutilized fishery resources. ("Shin Suisan Shimbun Sokuho," Sept. 8.)

* * *

EDA-FINANCED FREEZING PLANT
AND DOCK FOR YAKUTAT

The U. S. Commerce Department's Economic Development Administration has approved a $831,000 grant and a $357,000 loan to build a dock and a fish-freezing plant at Yakutat, Alaska. The EDA funds will finance the total project cost of $1,188,000. The loan will run 25 years at 4¼ percent interest.

Yakutat is on Monti Bay, an ice-free, deep-water harbor in southeastern Alaska. Fishing is the economy's mainstay. Timber, another resource, is underdeveloped.

The EDA project will include construction of a heavy-duty dock so that steamship service, discontinued because of run-down docking facilities, can be resumed. The project also includes construction of a flash-freeze, cold-storage plant employing 15 workers. The plant also will increase jobs and income for fishermen.

* * *

JAPANESE TO BUY SALMON AND TROUT

Gov. Hickel has announced that the Japanese firm Mitsubishi will station a freezership at Cape Blossom--14 miles south of Kotzebue, just above the Arctic Circle. A U. S. businessman will sell to them 400,000 pounds of chums and 60,000 pounds of trout. The Japanese have agreed also to take all salmon eggs.

The freezership can freeze 7 tons and salt 5 tons of fish a day. Fish will be produced by about 50 local fishermen. They will get 10 cents a pound for the salmon. (Practically all inhabitants in this general area are Eskimos.) Ashore, about 25 women will be hired to clean and lightly salt the fish. Gov. Hickel said this will utilize the "heretofore undeveloped chum salmon run in the Arctic."

This is the first report of a recent U. S. effort to take Arctic chums commercially. However, the Japanese will have in the area, for the second year, an "exploratory" chum salmon fishing operation. In 1966, a 200-ton vessel "Hoko Suisan", took close to 200,000 pounds of Arctic chums. This year the company will send a 300-ton vessel. At least 10 Japanese fishing companies applied for licenses to fish this year, but the Japanese Government licensed only one. This was due in part to U. S. and Soviet objections to such a fishery.

## Louisiana

CUBAN VESSELS FISH OFF LOUISIANA

In August, the U. S. Coast Guard confirmed reports of New Orleans sports fishermen that Cuban vessels were fishing in the Gulf, 40 miles off Louisiana's shoreline. As many as 20 vessels were sighted at one time.

They are conventional steel-hulled vessels 40-100 feet long. They are fishing with thousands of hooks hanging on miles of line strung across tuna and marlin grounds at the edge of the Continental Shelf. The Cuban fishermen string out stout lines of hooks, which often are 5 miles long and have 1,000 or more hooks at a depth of 120 feet.

New Orleans sportsmen complained to the Coast Guard that the Cuban operations are cutting into the supply of marlin and sailfish. The Coast Guard maintains that nothing can be done about it because the fleets are in international waters.

## Oregon

### RAZOR CLAM YIELD IS BEST IN DECADE

The 1967 razor clam season was the best since 1958 as Oregon beaches yielded more than 1.5 million of them to an estimated 65,000 diggers. The near-record haul came despite an experimental closure of the productive Clatsop beaches from July 15 thru August 31 by the Oregon Fish Commission. The commission sought to curtail the high percentage of small clams wasted during that period.

#### Ban Is Success

The experimental ban shows signs of being a major success. Preliminary data from the commission's shellfish staff in Astoria indicate a 60 percent reduction from the 1966 wastage of 500,000 small razor clams. Biologists point out, however, that diggers discarded about 200,000 small clams this year--despite the experimental closure and long-standing requirement that the first 24 razor clams dug must be kept regardless of size.

Razor clams may still be dug year-round from beaches south of Tillamook Head. Fair digging can be found on Indian, Arch Cape, and Cove or Falcon Beaches, all in the Cannon Beach area. Clams in these areas were reported quite large.

Commission shellfish biologists anticipate a significant carry-over of large clams on the Clatsop beaches due to the closure. They say the outlook for Oregon razor clammers is excellent next year. (Oregon Fish Commission, Aug. 2.)

* * *

### EARLY FALL CHINOOK CATCH IS ABOVE AVERAGE

Chinook salmon landings from the Columbia River during the recent early fall commercial fishing season were about 20 percent above the average of the past 7 years. Preliminary figures show that during the 16-day season--from August 6 to August 26--125,600 fall chinook weighing 2,840,000 pounds were taken. Arthur L. Oakley, Columbia River fisheries management project leader for the Oregon Fish Commission, said the figures were based on landings at major canneries and may be revised when all remaining landing reports are in.

The average catch of fall chinook in the August season since 1960 has been 105,000 fish, Oakley said. Based on landings only, it appears the fall chinook run is normal in timing this year and will be near the 263,000 fish predicted by biologists of the Oregon Fish Commission and the Washington Department of Fisheries. (Oregon Fish Commission, Aug. 31.)

* * *

### RECORD COHO LANDINGS REPORTED

The best commercial troll landings of coho salmon for a comparable period in the 42 years since complete record keeping began have been reported from Oregon ports thus far this season, according to the Oregon Fish Commission.

In the first 6 weeks of the coho troll season, which opened June 15, commercial fishermen landed 4,098,000 pounds dressed weight. Last year, the landings for the same period totaled 2,647,000 pounds dressed. Since 1948, the average troll landings of coho for the same period have been 1,100,000 pounds.

Robert E. Loeffel, biologist in charge of troll salmon studies for the Fish Commission, said the figures include landings of 390,000 pounds at Ilwaco, Washington, where fishermen who work the waters off Oregon land their catches.

#### Coho Landings Improve

Coho landings off northern Oregon and southern Washington were relatively light during the first few weeks of the season, but they improved recently, Loeffel said. During the 1966 season, coho fishing generally was better off the southern half of the coast but, during the previous year, it was more productive northward.

The offshore showing of salmon is excellent and substantial numbers of hatchery-marked fish are showing up in the catch. Thus far, Oregon Fish Commission Klaskanine and Alsea hatchery marks have been the most common, although other stations also are represented by fin-clipped fish. In addition to the Fish Commission, the Washington Department of Fisheries and the U. S. Fish and Wildlife Service liberate large numbers of coho each year.

Loeffel said that while the hatcheries undoubtedly are contributing much, the spectacular sport and commercial fishing cannot be attributed solely to hatchery releases. He added that natural spawning still plays an important role in maintaining fish runs. Ocean survival conditions also are extremely important in determining success or failure of salmon production. These conditions, presently not well understood, appear to have been very favorable off the Oregon coast during the past few years. (Oregon Fish Commission, Aug. 8.)

## Texas

REPORT ON SHRIMP FISHERY

The Texas shrimp fleet lands about 64,000,000 pounds of shrimp worth over $25 million each year. About 80 percent of shrimp landed are brown shrimp. Most of the catch is taken within 20 miles of the 375-mile-long Texas coast in 1-5 day trips. When catches off Texas decline, many boats travel to the Bay of Campeche near Mexico's Yucatan Peninsula. Trips there may last 50-60 days. They are usually made in winter, when sudden storms are frequent. For economic reasons, shrimp are loaded on one shrimp or freezer boat and shipped to Texas. This allows the other shrimpers to fish longer and make the trip worthwhile.

Because salt water anglers prefer live shrimp as bait, a multimillion-dollar industry has developed on the Texas coast.

These are some of the facts contained in "The Shrimp Fishery In Texas," by A. W. Moffett, published by the Texas Parks and Wildlife Department.

Industry Developed After World War I

After World War I, commercial shrimping developed from a small, part-time industry to the most valuable sea fishery in the U. S. Texas fishermen played an important part in its development. Modern shrimping is exclusively a bottom-trawl fishery.

With the introduction of trawl, the industry boomed. Fishermen had the tool that needed only a small crew, could catch more shrimp in less time, and could fish efficiently dense shrimp stocks in Gulf of Mexico.

Fig. 1 - Life history of a shrimp. (a) shrimp eggs; (b) nauplius larva; (c) protozoea; (d) mysis; (e) postmysis; (f) juvenile shrimp; (g) adolescent shrimp; (h) mature adult shrimp. (a, b, c, d, and e after Heegaard.)

Before the late 1940s, white shrimp supported industry. After 1947, catches dropped dangerously. Shrimpers were forced into deeper Gulf waters--where they found vast quantities of brown shrimp.

In 1955, shrimpers at Rockport developed a very effective method of trawling--"double rig". A single boat pulled 2 identical trawls simultaneously. The trawls were 40-42 feet wide at mouth. Catches increased 15 to 30 percent. Within 2 years, a large part of Aransas Pass fleet converted to the new system. Its popularity grew and the trend spread to other states. Virtually all offshore shrimp vessels built in recent years were double-rigged; many pull two 75-foot trawls.

Modern shrimp vessels come in all sizes: small "mosquito" boats that shrimp in the bays to 50- to 85-foot super-trawlers that can fish the bays and Gulf waters. Unlike the primitive earlier craft, today's large trawlers carry up-to-date navigational aids: radar, fish finders, fathometers, ship-to-shore radios.

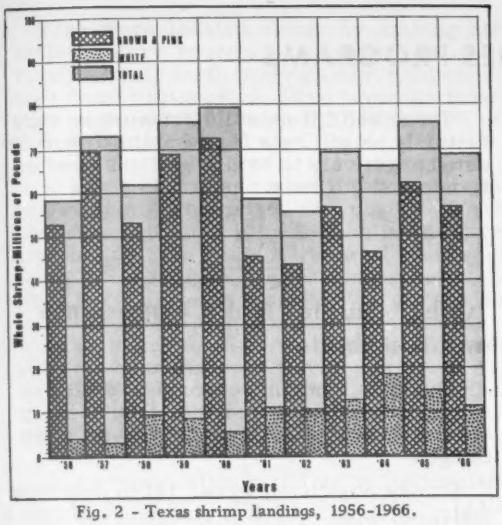



Fig. 2 - Texas shrimp landings, 1956-1966.

Fig. 3 - Shrimping areas of the Western Gulf of Mexico (after Hildebrand).

## Shrimping Grounds

Brown shrimp are caught all year in the Gulf. The area from the Colorado River to Sebree Bank is trawled heavily to 175 feet, but shrimping between Freeport and Sabine Pass is limited to waters less than 100 feet deep. Most brown shrimp are taken in outside waters, but juveniles are plentiful in coastal estuaries in spring and summer--but are protected by law.

The prime white shrimp grounds stretch from the Mississippi River west to Freeport, Texas. Best catches are made in water under 85 feet; some catches are made out to 120 feet. White shrimp reach larger sizes than brown in the bays. Whites are the mainstay of fall bay shrimping, especially along upper coast where estuaries are less salty.

Pink shrimp are fairly abundant in catches off the central and lower coast in spring and fall. Their scarcity off the upper coast may be due to lack of suitable nursery habitat. The young prefer firm bottom and protective vegetation--turtle grass or algae. The centers of commercial abundance are Florida's Dry Tortugas and Mexico's Campeche Banks.

## Wisconsin

### RHODE ISLAND TRAWLER TO FISH ALEWIFE IN LAKE MICHIGAN

Wisconsin has issued a license to a Rhode Island trawler to begin fishing for alewife in Lake Michigan. This will be the first time an ocean trawler has participated in the Great Lakes trawl fishery. Its experience may lead to increased efficiency in the trawl fleet.

# BUREAU OF COMMERCIAL FISHERIES PROGRAMS

## Electrical Field Increases Catch Rates in Lake Michigan

Comparable tests of trawl gear with and without an electrical field were recently completed aboard the exploratory research vessel "Kaho" in Lake Michigan. The tests were made by personnel of BCF's Ann Arbor Exploratory Fishing and Gear Research Base. Twenty-one experimental trawl drags were made: 10 used an electrical field in the trawl's forward part, and 11 were without an electrical field. The results showed a higher catch rate per half-hour of fishing effort for alewife, white suckers, and smelt when electrical field was used.

Using an electrical field, 931.3 pounds of alewife were taken, compared to 724.9 pounds when a nonelectrified trawl was used.

White suckers and smelt were taken with the electrical trawl at the rate of 51.9 and 26.7 pounds, respectively. The nonelectrified trawl produced only 32.7 and 7.6 pounds of white suckers and smelt.

## "Cobb" Completes Saury Explorations

The John N. Cobb (Cruise 89) returned to Seattle on September 8 after a three-week saury (Cololabis saira) survey off the coasts of Oregon, Washington, and southern British Columbia. The gear systems used included a midwater trawl, two lift nets, and a variable mesh gill net. They were used with an 11.5 kw. blue-and-red incandescent light attraction system.

Saury at 80% of Stations

Saury were observed at more than 80 percent of the 32 stations occupied. The greatest abundance of large fish was encountered west of Destruction Island (30 miles offshore) and a lesser, but substantial, quantity 5-10 miles offshore near the 42nd parallel. Once, near Destruction Island, dense concentrations of fish were observed in the searchlight beam over a 3-4 mile area. Saury were not encountered in water temperatures higher than 18.9° Centigrade. However, no definite trend was established for saury distribution and abundance relative to lower temperatures.

Trawl and lift nets did not work as satisfactorily as gill nets for sampling; saury reacted negatively to bridle systems used on trawls and gill nets.

## "Cobb" Studies Hake Abundance and Distribution

The John N. Cobb returned to Seattle in August after a 4-week cruise (No. 88) in coastal waters of Washington and northern Oregon.

Cruise objectives were: (1) to determine distribution and relative abundance of hake in area of operation; (2) assist commercial vessels in locating concentrations of hake; (3) observe diel behavior and availability of hake, and (4) to investigate daily change in the vertical movements of euphausiids, the principal food organism on which it feeds in Washington waters.

The Gear

The BCF Universal trawl was used. It is a modified Cobb pelagic trawl and can be fished on and off bottom. The webbing throughout is $2\frac{1}{2}$-inch mesh with a liner of $\frac{1}{2}$-inch mesh placed in the codend to retain small organisms. Hydrofoil doors were used to spread the trawl.

A 6-foot Isaac-Kidd trawl was used to sample macroplankton. The body and intermediate sections of the net were constructed of $3\frac{1}{2}$-inch mesh webbing and lined with $\frac{1}{8}$-inch mesh nylon netting; the codend was constructed of $\frac{1}{8}$-inch mesh nylon netting. No collecting bucket was used.

A high-resolution, low-frequency echo sounder was used to locate fish.

Method of Operation

A double warp trawling arrangement was used in fishing the BCF trawl; a single warp arrangement was used to fish the Isaac-Kidd trawl. Depth of nets was determined by a depth-telemetry system.

Towing speed for the BCF trawl ranged from 1.2 to 2.4 knots; the Isaac-Kidd trawl, 4 to 5 knots.

Fish were located either by making offshore-inshore sounding transects, or by sounding along depth contours where hake had been found previously. When probable hake signs were located, they were fished with the BCF Universal trawl.

In areas where hake were located, systematic sampling determined diel changes in vertical distribution of hake and their chief prey, euphausiids. No attempt was made to sample both hake and euphausiids during same period. When hake diel movements were investigated, hake signs were fished whenever present. When no signs could be distinguished on echo sounder, or signs were fairly well scattered throughout the water column, 3 depths were fished with BCF trawl--near bottom, mid-depth, and 10 fathoms below surface.

Since euphausiids could not be distinguished by echo sounder, 3 depths were fished (7 fathoms off bottom, mid-depth, and 5 to 10 fathoms below surface) once every 3 hours during periods of 12 and 18 hours. The 12-hour period was from 1800 Pacific Standard Time (evening) to 0600 hours (morning); the 18-hour period was from 0400 hours (morning) to 2200 hours (evening). The duration of the Isaac-Kidd trawl tow at the depth of sampling was 15 minutes; most of its catches were preserved in 10% formalin. A few catches of euphausiids and cumaceans were frozen to be studied later for food value and level of radioactivity.

Samples of hake from selected hake catches were frozen for later examination of stomach contents. Cursory examination of stomach contents was also made from selected catches. A sample of 200 hake from selected catches was measured by sex.

When diel movements of hake and euphausiids were investigated, a profile of the temperature from sea surface to near sea bottom was obtained by bathythermograph cast usually made every 3 hours.

## Results

Distribution and availability of Pacific hake: The areas off Washington where hake were available in large quantities were: (1) off Willapa Bay to southwest of Grays Harbor over bottom depths of 33 to 52 fathoms; (2) north of Grays Harbor to Queets River (24-52 fathoms); and (3) between La Push and Destruction Island (29-40 fathoms). (See figure 1.)

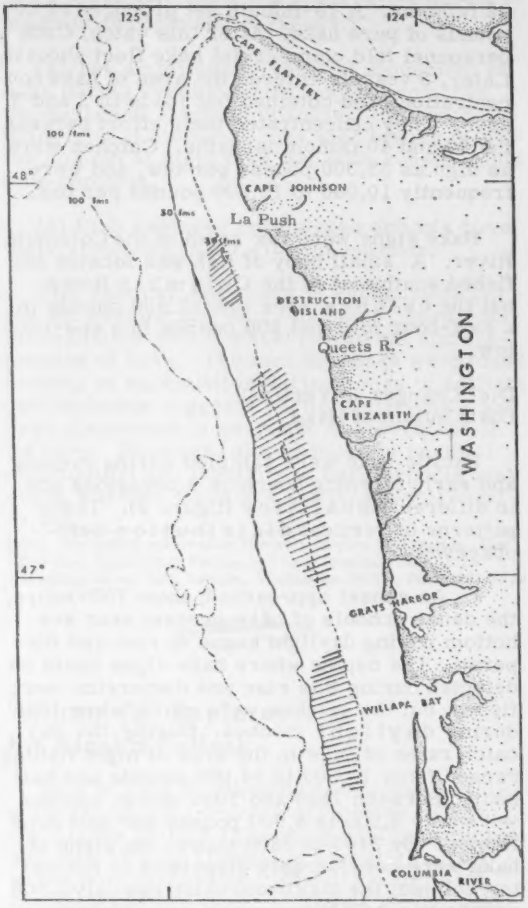



Fig. 1 - Localities where hake were found in large schools (slanted lines) and where diel changes in the vertical distribution of the hake were investigated (darkened areas).

The commercial hake fleet located hake in the first two areas. In the third, the Cobb located fish which were fished later by commercial boats. When first located, the school off La Push was only $1\frac{1}{2}$ miles long in a narrow band over bottom depths of 29 to 32 fathoms. A half-hour set yielded 10,000 pounds of hake. The Cobb watched the La Push school for the remainder of the day and resumed fishing in the evening. Next morning, the signs of hake were few and a search for the main body of fish was made. The school was relocated about 1 mile south of the previous day's position. By then the school had increased. It was about $4\frac{1}{2}$ miles long and about

¾ of a mile wide over bottom depths of 29 to 32 fathoms. A 15-minute set produced 16,000 pounds of pure hake. After this catch, Cobb personnel told commercial hake fleet about it. Later, 3 vessels entered the area of hake concentrations and obtained full loads in 2 and 3 days. They concentrated their effort between the 30 and 40 fathom isobaths. Catches were as high as 35,000 pounds per tow, and were frequently 10,000 to 15,000 pounds per tow.

Hake signs were few south of the Columbia River. A small body of fish was located and fished southwest of the Columbia River, but the catches were low--2,500 pounds in a half-hour tow, and 200 pounds in a one-hour tow.

## Diel Changes in Vertical Distribution of Hake

Pacific hake were sampled during evening and early morning hours on 3 occasions and in different localities (figure 2). These patterns of vertical distribution were observed:

1. As sunset approached, about 2000 hours, the dense schools of hake present near sea bottom during daylight began to rise and disperse. The depths where hake signs could be detected during this rise and dispersion were fished, but the catches were much lower than during daylight catches. During the day, catch rates of hake in the area of night fishing ranged from 10,000 to 64,000 pounds per half hour. Between 1830 and 2030 hours, catches were only 3,500 to 6,000 pounds per half hour fishing. By 2100 to 2300 hours, the signs of hake were considerably dispersed in the water column; the maximum catch was only 2,000 pounds in a half hour.

Maximum dispersion appears to occur during midnight hours. It is reflected in scattered signs on echo sounder and low catches at the three fishing depths: near the surface at 10 fathoms, maxiumum of 90 per half hour; mid-depth, 60; and near sea bottom, 64.

2. As sunrise approaches, about 0500, hake begin to descend and regroup. By 0700, they have resumed schooling near the sea bottom. However, during each night and early morning sampling period, signs of hake in early morning had greatly decreased compared to previous evening. This is also reflected in smaller catches in morning hours compared to previous evening's catches. The maximum catch between 0200 and 0600 was 241 individuals (about 500 pounds) in one-half hour. The behavior of the school off La Push as described in "Results" (p. 25) suggests this possibility.

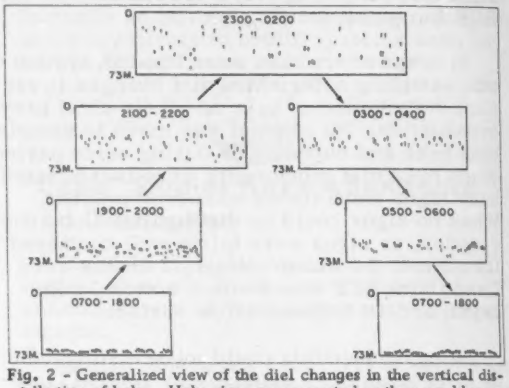



Fig. 2 - Generalized view of the diel changes in the vertical distribution of hake. Hake signs are presented as they would appear on an echo sounder. Depth presented in meters (73 meters=40 fathoms).

Figure 2 gives a generalized picture of diel changes in vertical distribution of the hake. Variations occur as observed during past surveys when hake were found a considerable distance (10 to 20 fathoms) off sea bottom during daylight hours. Also, hake possibly may undergo less dispersion and vertical ascent in late evening and midnight hours, as depicted in figure 2. From study of feeding habits, there is some suggestion that hake, which have their stomachs partially filled with food in the evening hours, may not ascend as high in the water column as hake with empty or almost empty stomachs. If majority of hake school are well fed, vertical ascent and dispersion may not be too great.

## Diel Changes in Euphausiids' Vertical Distribution

Euphausiids were sampled on 3 occasions off Queets River south to Cape Elizabeth, over bottom depths of about 44 and 52 fathoms. A complete analysis of the Isaac-Kidd trawl catches during these samplings have yet to be made, so only a generalized picture of the euphausiids' vertical distribution can be presented now (figure 3).

During daylight hours (0800 to 1400) no euphausiids were collected from near-surface tows (7-8 fathoms) nor from tows at mid-depth, but small catches (¼ to 1½ pounds) were

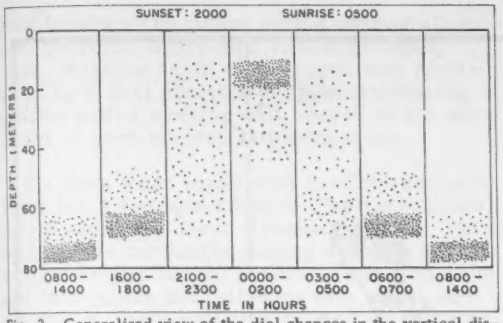



Fig. 3 - Generalized view of the diel changes in the vertical distribution of the euphausiid, Thysanoessa spinifera.

taken in tows near sea bottom. After 1800, euphausiids were collected during tows at all 3 depth levels. Largest catches were taken about 1800 and between 0000 to 0230 hours. At 1800 hours, about 20 pounds were taken in the near-bottom tow. Shortly after 1800, catches from tows at mid-depth and near surface were less than 2 pounds. The large catches (about 10 pounds) made during 0000 to 0200 were from tows near surface. Catches from tows at mid-depth and near sea bottom during same period were 2 pounds or less. At other periods of the evening, 2100 to 2300, and morning (0300 to 0500), catches from near surface and mid-depth were about comparable, but tows near sea bottom caught less than tows higher up. Only a few euphausiids were identified from each catch; in every instance, they were identified as Thysanoessa spinifera.

In general, it appears that the euphausiids are found near the sea bottom during the daylight hours. After 1800 there is a movement of the euphausiids off the bottom to near surface waters. They appear to reach their greatest density during the hours of darkness near the surface after midnight. After 0200 the euphausiids begin their descent and by 0800 are concentrated near the sea bottom again.

Feeding Habits of Hake

Although a detailed analysis of the stomach contents of hake has not been completed, a cursory examination during the cruise suggests:

(1) Euphausiids appear to be dominant food organisms of hake in Washington coastal waters during cruise period.

(2) Hake feed upon the euphausiids during hours of twilight and darkness.

(3) The amplitude of vertical movement of hake during evening hours may depend upon the degree of stomach fullness. Fish with little food in stomachs may rise higher in water column at night than fish with considerable food remains.

(4) Fish captured from dense schools have their stomachs filled with euphausiids.

The vertical movement of euphausiids during the evening and early morning hours coincides in time with vertical movement and dispersion of hake. The fact that hake were found feeding on euphausiids during hours of twilight and darkness suggests vertical movement and hake dispersion is response to movement of its prey. However, diel changes in vertical distribution and integrity of hake schools may occur whether there are euphausiids present or not.

Note: For further information contact: Dayton L. Alverson, Base Director, Exploratory Fishing and Gear Research Base, 2725 Montlake Blvd. East, Seattle, Washington 98102, Phone 583-7729.

## "Manning" Explores for Alaska Pollock

BCF's John R. Manning completed in July a 26-day pelagic exploratory cruise (67-2) for Alaska pollock (Theragra chalcogrammus) and pink shrimp (Pandalus borealis). It surveyed both inshore and offshore waters off the southeastern coast of Kodiak Island, and offshore waters of the southeastern Bering Sea between and due north of Umnak Island and Port Moller.

The cruises primary objectives were: (1) to gain information on species composition of midwater echo-traces observed in waters adjacent to Kodiak Island; the information would determine if commercially interesting species of shrimp occupied this layer, and (2) to obtain data on the availability of Alaska pollock to the 648 Cobb pelagic trawl.

2 Trawl Models

Sampling gear consisted of two models of midwater trawls: the 648 Cobb pelagic and a smaller version, the Cobb anchovy trawl No. 1.

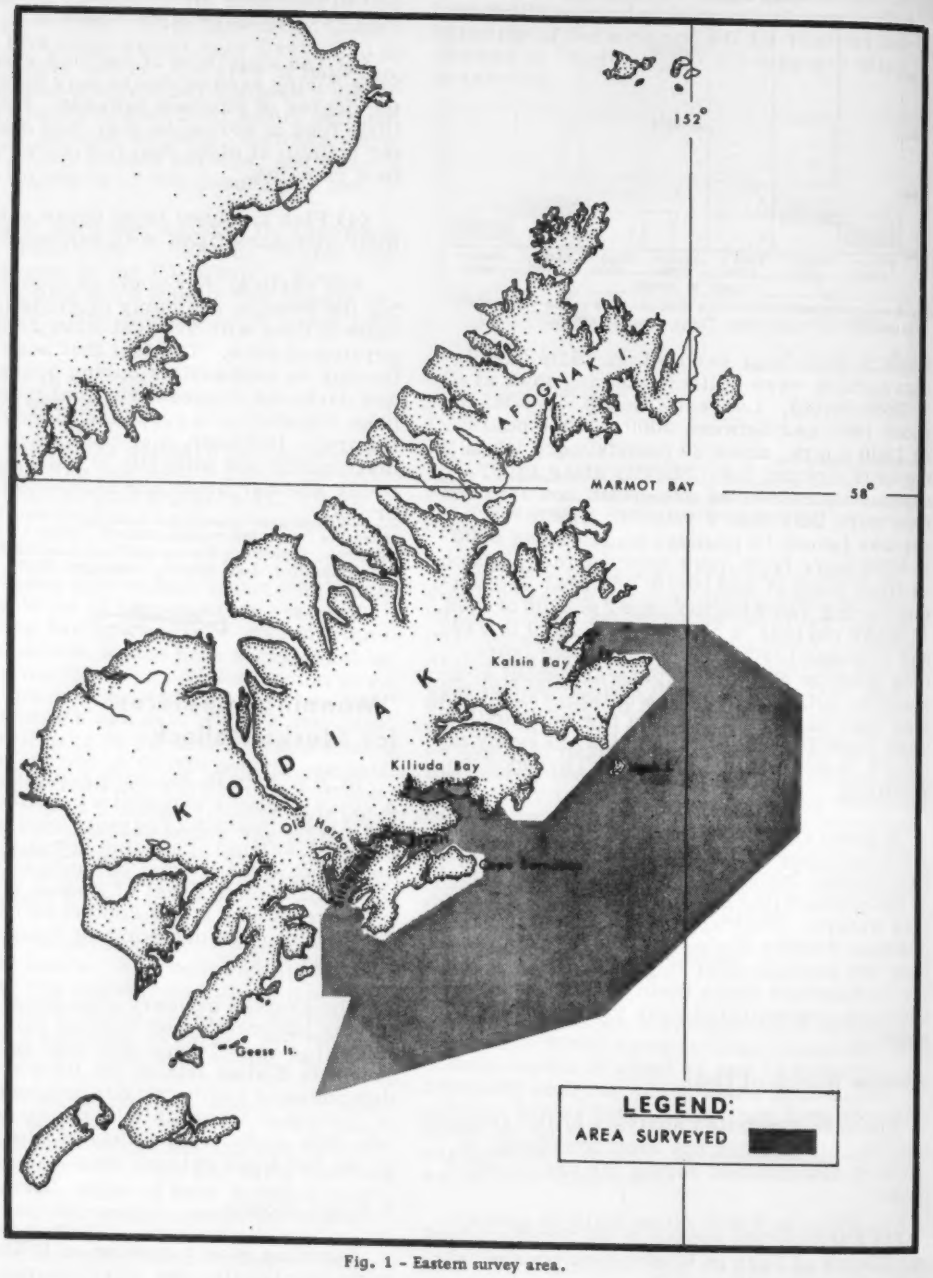



Fig. 1 - Eastern survey area.

Both trawls were fished with a pair of aluminum hydrofoil doors and 30 fathom dandylines. Fishing depth of the trawl was monitored by a dual electric depth-telemetering system with a sensing unit housed at the terminus of each electrical towing warp.

Six tows were made with the Cobb anchovy trawl No. 1 (on loan from the Seattle Exploratory Fishing and Gear Research Base). Transecting was conducted during evening and early morning hours, generally between 1700 and 0900 hours the following day. Both inshore (i.e., bays and straits) and offshore areas were surveyed; the majority of inshore survey time was spent in Sitkalidak Strait. Surveys offshore extended to about 30 miles due east of shore. Onshore-offshore sounding transects were made at oblique angles to shore, between the 25 and 92 fathom depth contours.

## Cruise Results

Midwater echo-traces indicative of possible pink shrimp concentrations were not observed in any offshore area surveyed, but they were observed in most inshore waters. Catch composition analysis of the five tows made in inshore waters showed pink shrimp the dominant species.

No commercial-size catches of pink shrimp were made. The largest catch, 710 pounds, (Haul No. 2, 775 pounds total) was captured during a 60-minute tow (intersection of Sitkalidak Strait and Kiliuda Bay). It was made through fair-to-good echo-traces between 25 and 40 fathoms over average bottom depth of 62 fathoms.

The single offshore tow (Haul No. 4, 12 miles ESE Cape Barnabus) captured 1,050

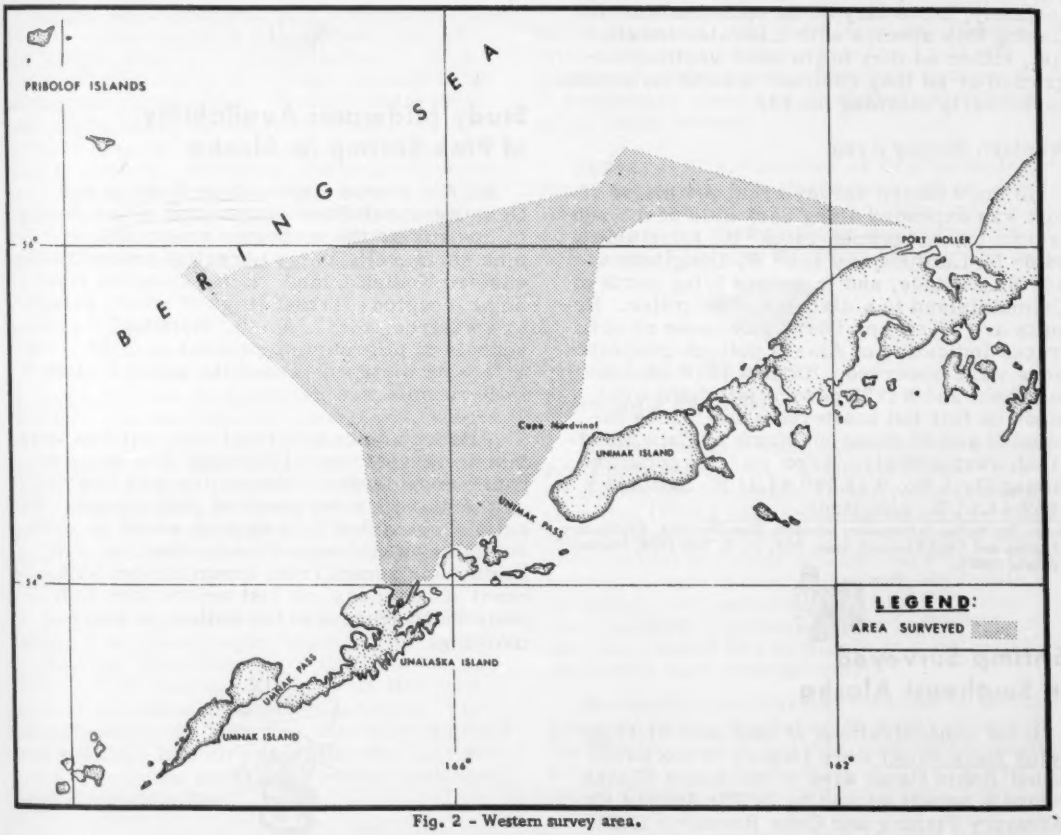



Fig. 2 - Western survey area.

pounds of small Alaska pollock ($\bar{x}$ 31 cm.). Strong echo-traces observed during this tow extended to maximum height of 12 fathoms from bottom, with bottom depth ranging between 68 and 73 fathoms. Recordings showed the school to be quite small, consisting of several small isolated nodules lying within a distance of one-quarter mile.

What Results Suggest

Results of catch composition analysis and echo-gram observations suggest that pink shrimp experience a daytime migration and are negatively phototropic (taking a particular direction under influence of light). A constant fathometer gain was used throughout the inshore survey area to help reduce problems associated with interpreting relative densities of echo-traces. If the results noted are representative of pink shrimp responses to light intensity, there may be an optimum time for fishing this species with midwater trawls, i.e., either as they begin their vertical migration or as they compact toward the bottom in the early morning hours.

Western Survey Area

In the western survey area, the major effort was expended along each side of the 100-fathom curve between 166.5° W. Longitude x 54.8° N. Latitude and 169° W. Longitude x 56° N. Latitude, and in waters lying north of Unimak Island to a distance of 90 miles. Results are disappointing because no echo-traces indicative of Alaska pollock concentrations were observed. Hauls 7 (500 pounds jellyfish) and 8 (125 pounds jellyfish) were made on fair but scattered echo-traces located 35 and 33 miles due north of Cape Mordvinof, respectively. Zero catch occurred during Haul No. 9 at 55° 44.1' N. Latitude x 168° 44.0' W. Longitude.

Note: For further information contact: Base Director, Exploratory Fishing and Gear Research Base, BCF, P. O. Box 1668, Juneau, Alaska 99801.

## Shrimp Surveyed in Southeast Alaska

Good concentrations of spot shrimp (Pandalus platyceros) were located in the Ernst Sound-Behm Canal area of southeast Alaska during a recent survey by BCF's Juneau Exploratory Fishing and Gear Research Base. The optimum soaking time for shrimp pots and shrimp bait preference also were investigated. Short soaking times were found to be most effective; seal meat proved superior as bait to herring, pet food, and salmon tails.

Trawls Prove Ineffective

BCF cooperated with a commercial trawler this summer to test the effectiveness of trawls for catching spot shrimp (Pandalus platyceros). Participating were personnel from BCF's Juneau and Seattle Exploratory Fishing and Gear Research Bases.

Midwater and conventional bottom trawls equipped with BCF-supplied depth-telemetry systems were fished by the trawler for 30 days in areas of Southeastern Alaska where spot shrimp were known to be abundant. Results indicated that trawls would not catch spot shrimp in commercial quantities.

## Study Midwater Availability of Pink Shrimp in Alaska

BCF's Juneau Exploratory Fishing and Gear Research Base cooperated with industry to investigate the midwater availability of pink shrimp (Pandalus borealis) around southeastern Kodiak Island. Echo-sounding transects, coupled with test drags of a Cobb pelagic trawl from the "John R. Manning" found schools of pink shrimp present at night at considerable distances above the ocean bottom in inshore waters.

Although no commercial-size catches were taken--largest was 710 pounds in a one-hour haul--considerable information was obtained on the diurnal movements of pink shrimp. Results suggest that pink shrimp would be most available to midwater trawls either as they begin their ascent from ocean bottom with onset of darkness, or just before they complete their descent to the bottom in early morning.

## "Bowers" Studies Use of Lights to Attract Anchovy

The R/V George M. Bowers cruised Mississippi Sound and Pensacola Bay to determine the effectiveness of a small-mesh purse seine for catching anchovies attracted to various types of above-surface and subsurface lights. (Cruise 80, ended Aug. 1.)

A variety of light attractors was used: a 90-lamp incandescent bank (13,500 watts), a 3,000-watt incandescent cluster, both systems use alternating current; a 500-watt 28-volt direct current underwater incandescent light; a 1,000-watt alternating current underwater quartz iodide light; and 3,250-watt alternating current above-surface mercury vapor lights.

A light skiff equipped with 2 above-surface 12-volt direct-current sealed beam lamps and a high intensity underwater photo lamp was used effectively to control the fish while setting the purse seine. Too few tests have been made under comparable conditions to indicate clearly the most effective light-attractor system. However, the largest individual catch (830 pounds) was made using the 13,500-watt above-surface incandescent and the 500-watt direct current underwater system. More tests are planned for the next cruise.

Species Caught

Three species of anchovies (A. hepsetus, A. mitchilli, and A. lyolepis), usually dominated the catches; however, small-size scaled sardines (H. pensacolae), Spanish sardine (Sardinella sp.), and thread herring (Q. oglinum) were taken in most catches. Juvenile and young Spanish and king mackerel were present in several catches. Most anchovies caught were less than 3 inches. A few of A. hepsetus were larger.

Summertime squalls created excessive turbidity in Mississippi Sound at times and limited the effectiveness of the light attractors. Water clarity in Pensacola Bay was good at all times despite gusty winds. Visual and electronic detection of anchovy schools was possible in both areas, but the light attractor systems performed better consistently in Pensacola Bay.

## Commercial Quantities of Calico Scallops off Florida

Surveys of the exploratory fishing vessel "Oregon" off Florida have found commercial quantities (20 bushels per hour) of calico scallops. Catches by the Oregon between Vero Beach and New Smyrna Beach are ranging from 36 to 64 bushels per hour.

BCF has told the local calico scallop industry in Florida and North Carolina of the Oregon's success. Industry members will board the vessel to observe further tests with trawl gear used by the commercial fleet for taking scallops. BCF efforts are aimed at aiding the scallop industry of the Southeast coast, which has recently experienced decreased catches.

The "Criswell," owned by Elmer Willis of North Carolina, will work with the Oregon. Willis reportedly has orders for 3,000,000 pounds of scallop meats from one customer. A restaurant chain and a cafeteria also have made large orders.

Harvey Bullis, Director of BCF's Exploratory Fishing Base in Pascagoula, Miss., believes the scallop resources located by the Oregon are as vast as those supporting the commercial fishery off North Carolina.

## Study Lake Superior Trawling Potential

Experimental fishing conducted by 2 cooperating trawlers, "A. E. Clifford" and "Hiawatha," in the Economic Development Administration (EDA) Technical Assistance Project has added considerably to knowledge of the commercial potential of Lake Superior. Test fishing in waters near Keweenah Peninsula, Michigan, demonstrated that bloater chubs are available regularly to trawls throughout the year; smelt are available in substantial quantities only intermittently.

Successful commercial trawling in Michigan waters of Lake Superior would depend on the development of suitable markets for small bloater chubs, small smelt, and suckers, which dominated the trawl catches. Trawl catches in western Lake Superior, where the amount of trawlable bottom is very limited, have consisted primarily of smelt and cisco.

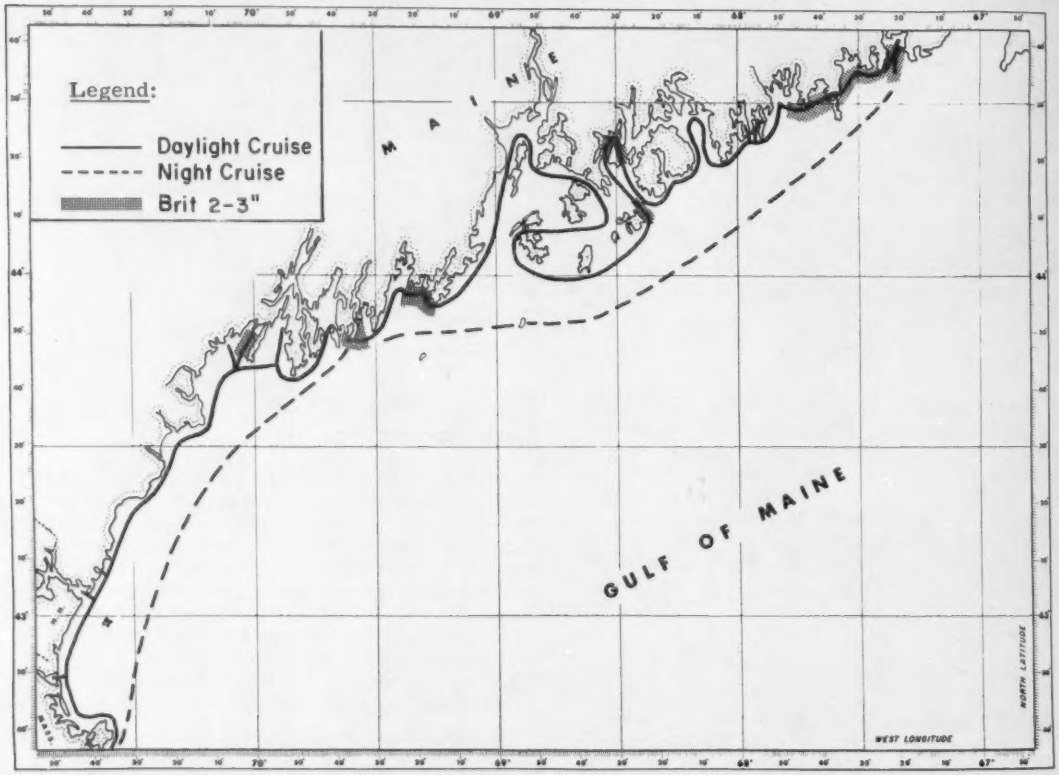
Echograms here suggest heavy concentrations of fishes above the lake bottom, where they are unavailable to bottom trawls. Midwater trawls will be used this fall to determine if these fishes can be harvested profitably.

## "Rorqual" Studies Summer Distribution of Small Brit

The R/V Rorqual of BCF's Biological Laboratory, Boothbay Harbor, Maine, conducted Cruise 3-67 in July to determine the summer distribution of small brit (2"-3") prior to their entry into the fishery.

Its preliminary findings: small brit (2"-3") were present only on the inshore transect. They were most numerous from Mooseabec Roach to Machias Bay, where traces were almost continuous. Concentrations also occurred in Muscongus Bay, the Sheepscot, and Damariscotta areas. No herring were observed from Sheepscot Bay to Cape Ann, except for a few taken in Casco Bay.

The Rorqual's area of operations was Cape Ann to Machias Bay, inshore to 5 fathoms and offshore to 50 fathoms. Measurements of salinity and temperature were made. The thermograph was run continuously. Surveys were made with an echo sounder, and traces were sampled with a high-speed trawl and a shrimp try net.




M/V Rorqual (Cruise 3-67).

## BCF Honolulu Aids Skipjack Tuna Industry

The aku fishery is the chief U. S. fishery in the central Pacific Ocean. Aku is the Hawaiian name for skipjack tuna. About 10 million pounds of this valuable food fish are caught each year. Although the Hawaiian resource is large, the industry has failed for several years to keep pace with the expanding U. S. economy. The fishing vessels are old and the number of fishermen decreasing.

To strengthen this industry, representatives of the State of Hawaii, the U. S., and the industry have joined to coordinate long- and short-term research on the central Pacific fishery problems.

John C. Marr, Director, Hawaii Area, BCF, says the major goal of research on skipjack tuna at BCF's Biological Laboratory in Honolulu is to increase the catch substantially--not only near Hawaii but in adjacent waters of the central Pacific. But the laboratory and other research agencies also face the shorter range problem of aiding the present Hawaiian fleet.

### Industry Is 2 Separate Fisheries

The skipjack tuna fishery consists of two separate fisheries: for skipjack tuna itself and for nehu, the little anchovy used as live bait. The skipjack tuna is caught by pole and line. Schools are attracted to the vessel by tossing handfuls of nehu overboard.

At present, each vessel fishes for its own bait and takes about 20 buckets (160 lbs.) of nehu for each trip. Studies show that a lot of time is spent fishing for bait that could be spent fishing for skipjack tuna. Director Marr believes this added time would produce a large increase in the total tuna catch.

The Honolulu lab is attacking the problems of obtaining bait in two ways. The first is by investigating the possibility of taking bait in stationary traps and nets. The ultimate aim here is to prove the feasibility of a small, independent, bait-catching industry. The second way is by studying other small fishes as supplements or substitutes for the nehu.

### Weir and Lift Nets Built

In a project partially supported by Hawaii, personnel of the lab's Fishery Development Program constructed an experimental weir and a night lift net and installed them in Kaneohe Bay, on the windward side of Oahu. The bay is one of the chief sources of nehu for the skipjack tuna fleet.

The heart-shaped weir, about 450 feet around, extends from shore into water about 10 feet deep. The baitfish are collected at night. A light attracts them into a small pocket at the tip of the weir. Richard S. Shomura, who heads the project, says results of the first weeks of operation have been encouraging. The lowest catch was less than 1 bucket of bait, but most have been larger; one reached 78 buckets. Another weir is under construction. Results with the lift net have been less successful; the largest catch was 16 buckets.

### Seek Alternate Bait Species

Alternate bait species have been tried in the Hawaiian fishery before. Now a new approach is being used. The behavioral characteristics of the nehu--which makes it so attractive to the skipjack tuna--have been studied. Knowing some of these characteristics, the scientists have been seeking other small fishes that equal or exceed the nehu. Several kinds have been tried. Some have been imported from mainland U. S., others from Southeast Asia.

Some of this work is done in shoreside tanks, some at sea. In the tanks, the behavior of the nehu and other prey fish has been observed in the presence of a predator, usually the kawakawa, a close relative of the skipjack tuna.

At sea, scientists have donned diving gear to study the behavior of the bait species and the tunas under actual fishing conditions. Using scuba, they have measured the diving rates of the baitfish and observed other aspects of their behavior. John J. Magnuson, head of the lab's behavior studies, says films also have been taken and are expected to provide quantifiable data on baitfish behavior.

The most promising alternate species so far is the threadfin shad, a fresh water fish introduced into Hawaii about a decade ago. The shad has naturalized itself in Hawaii. Other species are still being studied.

Operations Analysis of Fishing

The program to aid the industry includes an operations analysis of fishing activities. The captains of the fleet have cooperated. During the summer of 1967, for the first time, trained observers were stationed aboard several fishing sampans and recorded every aspect of the fishing operation--from the time the vessels left port until the catch was unloaded.

The information they collected, millions of separate items, are being coded for analysis by computer. Preliminary inspection of the data shows that it will provide much new information, says Tamio Otsu, who supervised the project.

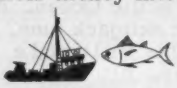
Where Does Fish Spend Its Time?

Researchers do not know where the fish spend the time they are not at the sea surface--most of their time. The laboratory's research vessel "Townsend Cromwell," equipped with a high precision sonar, spent much of summer 1967 studying this problem. The sonar gathers information on the depth a target is swimming, its direction, and its speed. So far, most targets have been located within 30 feet of the surface. There is another heavy concentration between 200 and 500 feet. Skipjack tuna schools have been tracked from the surface to the depths. More than half went deeper than 200 feet, between their sorties to the surface. Some went down to 400 feet.

The Waters Studied Too

The observers aboard the skipjack tuna sampans have been collecting information on the temperature and salinity of the waters in which tunas are caught. To add to this information, the Townsend Cromwell, in summer 1967, the height of the fishing season, collected oceanographic data both in and outside the fishing area. These data are now being analyzed. The information from fishing vessels and the Cromwell is expected to pinpoint physical and chemical characteristics of waters in which the fish are caught.

A final line of attack on the skipjack tuna problems is the application of the methods of systems analysis widely used in industrial and military planning. Brian J. Rothschild, Acting Deputy Area Director, BCF, Hawaii, says the object of such a study is to design an economically feasible plan for the operation of the Hawaii-based fishery for tunas. It would be one healthy enough to stimulate investors to put their money into it.



## "Delaware" Studies Herring and Lobster Offshore Populations

The M/V Delaware of BCF's Biological Laboratory at Boothbay Harbor, Maine, cruised the northern part of Georges Bank and Lydonia Canyon, September 6-15 (Cruise 67-6).

The cruise, hampered by bad weather, had 3 purposes: to sample populations of sea herring and lobsters and to obtain related environmental data; to obtain blood samples from lobsters; and to make plankton tows for larval herring.

Fishing Operations

To sample herring population, 18 trawl sets were made. The sets, of 1 hour duration, were made in 26 to 53 fathoms and yielded 19 bushels (approximately 1,400 pounds). The herring obtained were 21.7 to 36.5 cm. long. The 1960- and 1961-year classes were dominant in the catches, followed in percentage occurrence by fish of the 1959-year class and older. Shipboard examination indicated the majority were in stage V of gonadal condition. To sample lobster population, 5 trawl sets were made at Lydonia Canyon in waters from 55 to 120 fathoms. They yielded 18 lobsters (44% females and 56% males). Only one lobster was berried.

Plankton Operations

Thirteen 1-meter net plankton tows of 15-minutes duration (5 minutes at 20 meters, 5 minutes at 10 meters, and 5 meters at surface), were made. No larval herring were obtained.

# "Geronimo" Cruises Entire Gulf of Mexico in Late Winter

By Reed S. Armstrong and John R. Grady*

BCF's R/V Geronimo, Galveston, Texas, has completed the first in a series of hydrographic surveys of the Gulf of Mexico (Cruise 12). The immediate purposes of these surveys are to describe the circulation and stratification in the Gulf of Mexico and to analyze the time variations of Gulf waters. Additional, long-range, goals are to relate the state and variations in the waters to the driving force (the atmospheric circulation), and to predict the circulations and characteristics of the waters. We intend to occupy about 135 hydrographic stations, sampling from the surface to the bottom, over all the Gulf during each cruise. Bathythermograph casts--and standard meteorological observations and radiation measurements for heat budget analyses--are made routinely along the cruise route.

During this first "all Gulf" cruise (Feb. 20-April 1, 1967), continuing problems with the ship's navigational gear curtailed operations in the eastern Gulf, but the cruise plan was rearranged to accomplish a rather comprehensive survey of the entire Gulf. We occupied 114 hydrographic stations and collected surface salinity samples and made bathythermograph casts at 281 stations.

We had planned to make vertical plankton hauls to 100-m. depth with a $\frac{3}{4}$-m. Hansen net at each hydrographic station--and to make vertical plankton hauls to near the bottom in the deeps of the Gulf with a Gulf V sampling net. Because of almost continuously poor weather and high seas, only 87 shallow and 2 deep plankton hauls were made.

This cruise was very successful, particularly because it was only the second time the entire Gulf of Mexico has been surveyed during one cruise operation. (The first was by the R/V "Hidalgo" of Texas A & M University in Feb.-March 1962.)

As the data are processed and analyzed, numerous interesting features of the Gulf waters are noted in surface distribution of the various water properties.

The circulation pattern of the surface waters can be inferred from the surface temperature distribution (fig. 1). Warm water (more than 24° C.) from the Caribbean Sea is the main driving force for the circulation throughout most of the Gulf. The water enters the Gulf along the western side of the Yucatan Straits and streams north to about 28° N. latitude. It then turns sharply to the south and, after following a rather intricate path, leaves the Gulf through the Florida Straits.

Some of the water entering the Gulf returns as countercurrents, in a series of eddies, on the western side of the Yucatan Straits. Other Caribbean water encounters an apparent countercurrent from the Florida Straits off the coast of Cuba, thereby setting up the clockwise-rotating eddy of the "C"-shaped cell of water more than 26° C. The flow from the western edge of this eddy to about the center of the Yucatan Straits is moving south, back in the Caribbean. The remaining water coming into the Gulf seemingly moves westward across the Campeche Shelf and then turns northeastward to join the main flow.

The circulation of the eastern Gulf of Mexico is reacting directly to the looping flow that enters through the Yucatan Straits and departs through the Florida Straits. Interaction of this loop current with adjacent waters establishes the circulation over most of the western Gulf. The general easterly and northeasterly flow in the western Gulf is probably also associated with the prevailing south and southeast winds over the area. The small pockets of cool water near shore may be associated with river discharge and land runoff.

Three particularly significant features are apparent from the temperature distribution: (1) the presence of a southward flowing countercurrent through the Yucatan Straits; (2) the lack of offshore penetration of Mississippi River discharge; and (3) the turbulent characteristic of oceanic circulations, as evidenced by the presence of numerous eddies, particularly those lining the boundary of the main flow of the loop current.

The distribution of surface salinity (fig. 2) almost exactly follows the temperature patterns. The Caribbean water in the eastern

*Research Oceanographers, BCF Biological Laboratory, Galveston, Texas.

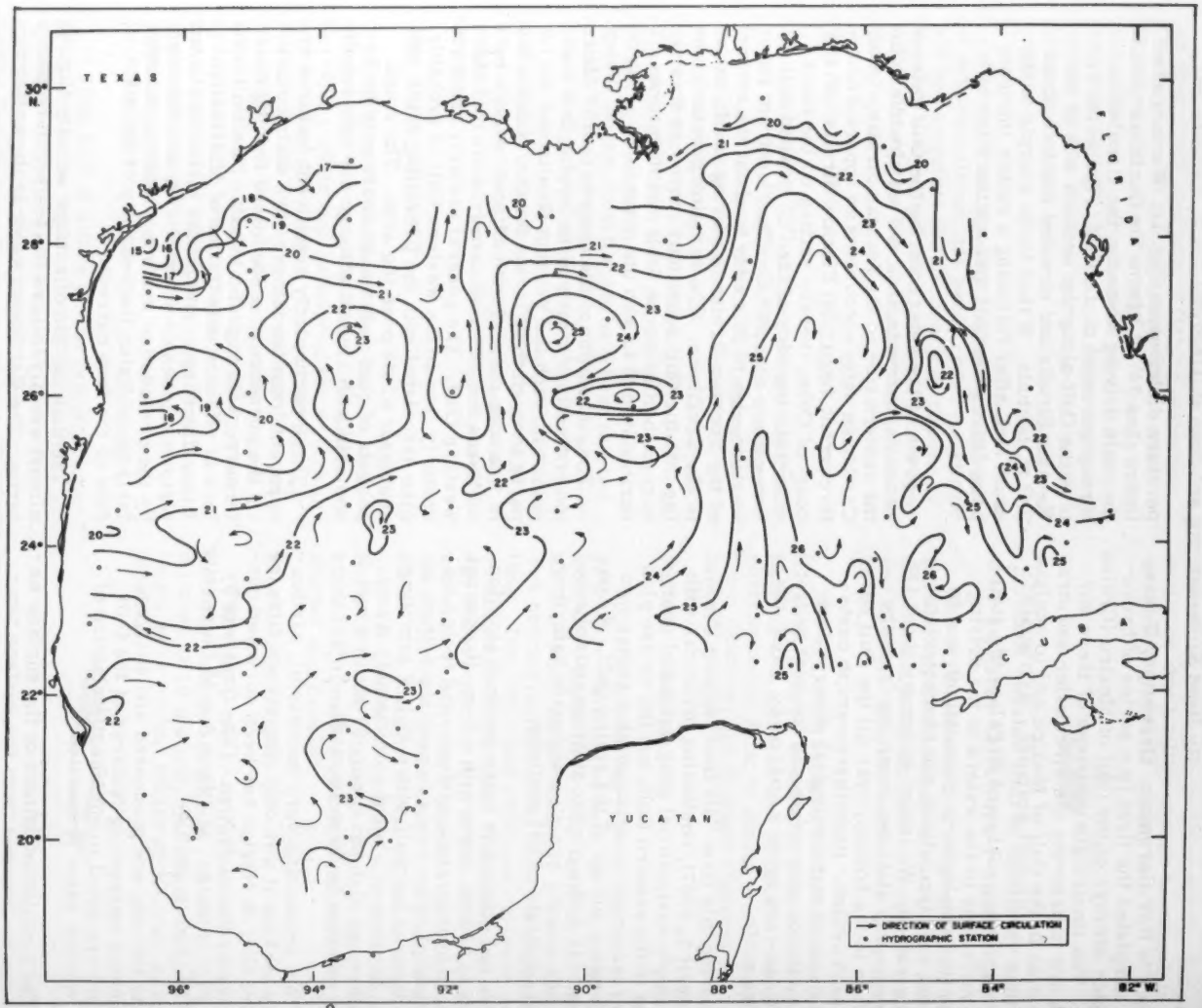



Fig. 1 - Surface temperature distribution (° C.) and the associated pattern of the surface circulation from Cruise 12 of the R/V Geronimo (February to April 1967).

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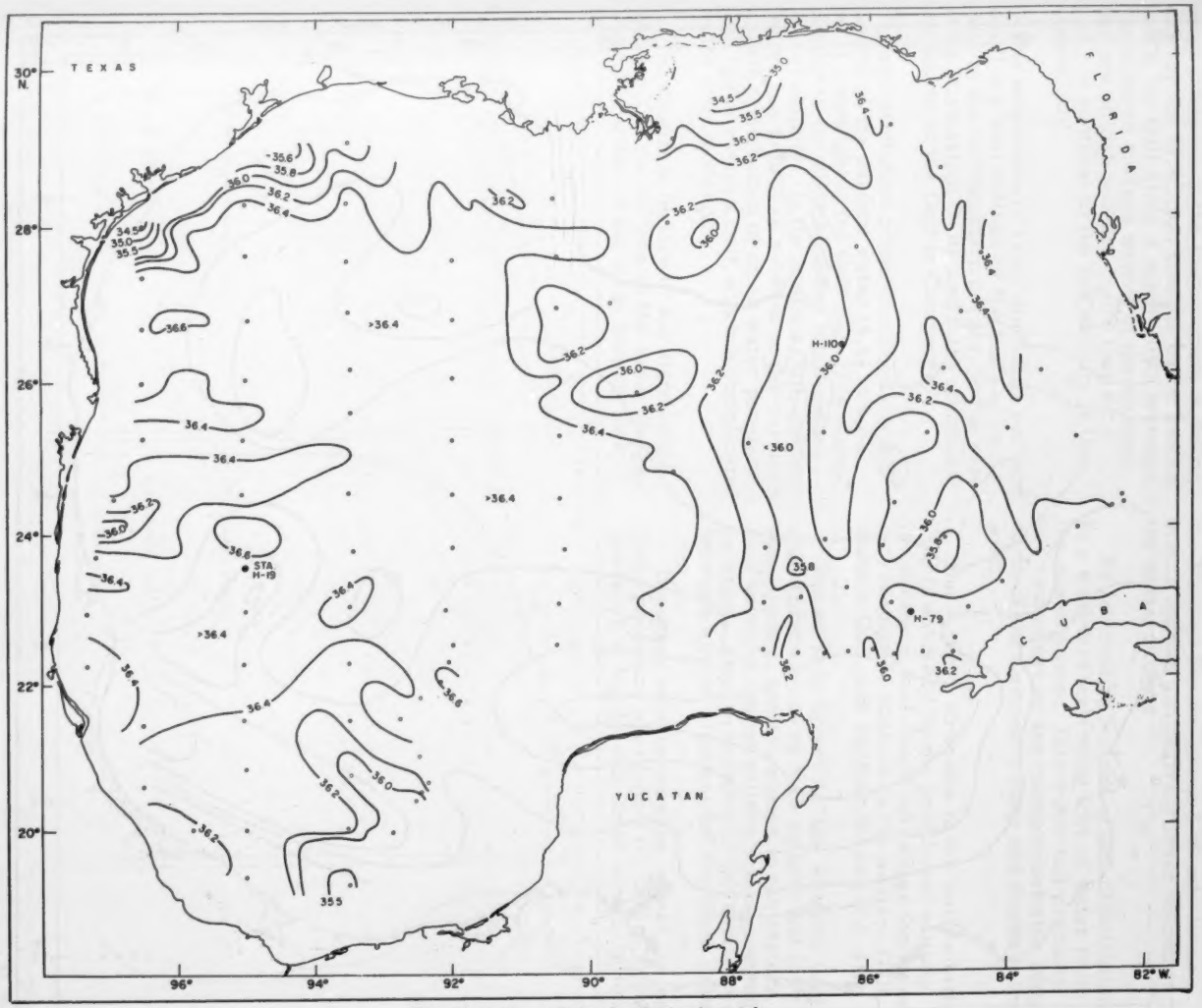



Fig. 2 - Surface salinity distribution (p.p.t.).

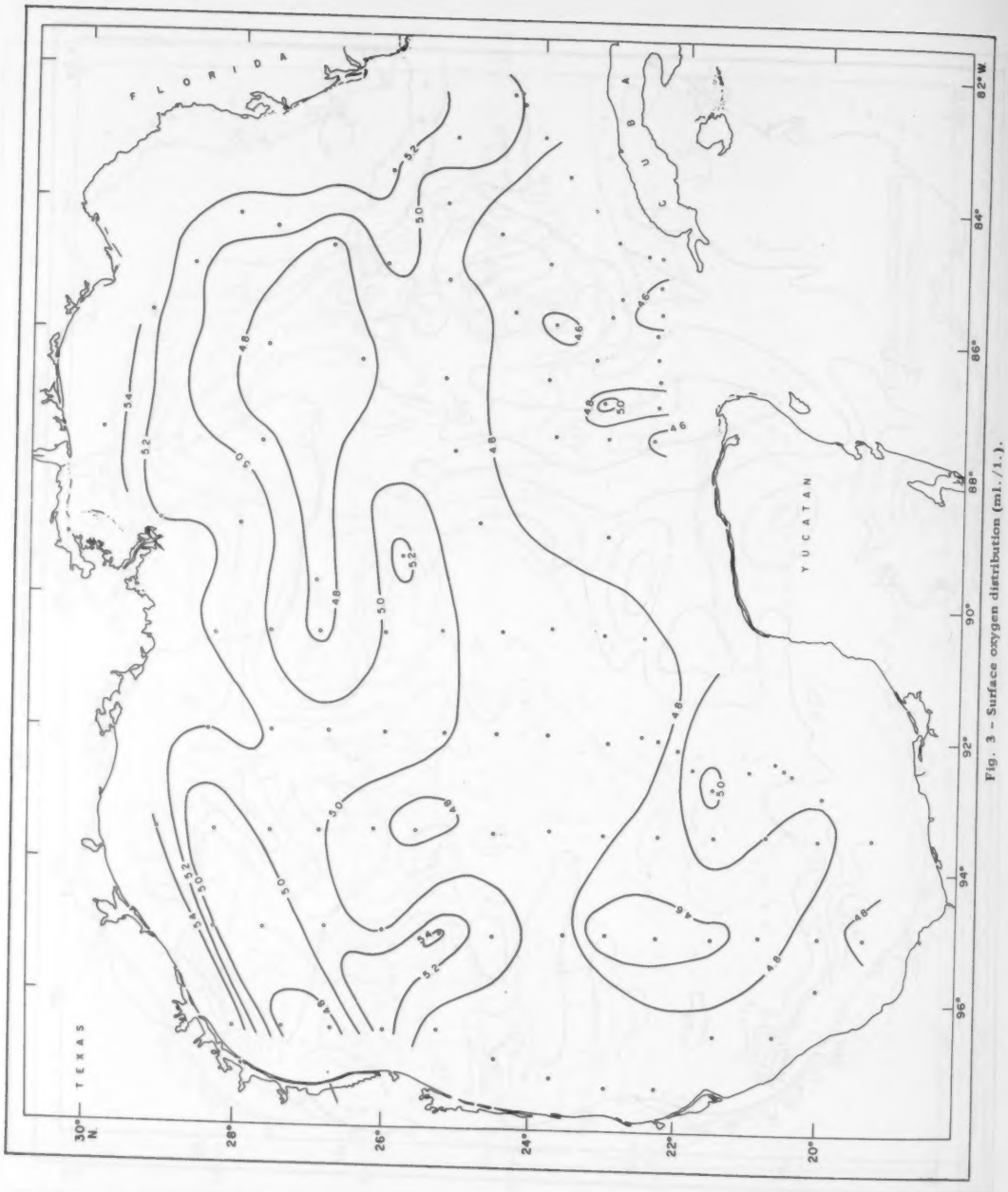



Fig. 3 – Surface oxygen distribution (ml./l.).

Gulf is easily distinguished by its low salinity; 36 parts per thousand (p.p.t.). The rather direct influence of the loop current is delineated by the 36.4 p.p.t. contour in the central part of the Gulf along a north-south transect. The offshore surface waters of the western Gulf are of high salinity (more than 36.4 p.p.t.) in contrast to the low salinity in the eastern Gulf.

The extensions of river discharge and land runoff are well defined by the low-salinity cells in the northwestern corner, to the east of the Mississippi Delta, and in the southeastern sector of the Gulf of Campeche.

The distribution of the dissolved oxygen content of the surface water (4.40 to 5.55 ml./l.) throughout the Gulf (fig. 3) is more similar to the distribution of temperature than of salinity. In the eastern Gulf, surface oxygen has a clearer relation to the currents and the distribution of other water properties than in the western Gulf, which is complicated by the eddy systems.

The dominant feature of the distribution of oxygen at the surface is the lower oxygen content of water of the large looping flow of the eastern Gulf. The relatively low oxygen content of the water entering the Gulf through the Yucatan Straits (about 4.48 ml./l.) accounts for the distinctively lower values in the eastern Gulf.

An interesting feature of this distribution is a westward-extending lobe of water from the eastern loop. This water has probably been entrained by the counterclockwise eddy north of the Campeche Bank and drawn to the west.

The vertical structure of the waters in the Gulf is exhibited by the profiles of salinity, temperature, and dissolved oxygen for three representative stations in the western Gulf, eastern Gulf, and Yucatan Straits (fig. 4).

The surface layers in the western Gulf are characterized by high salinity and low temperature, and the waters in the eastern Gulf have the lowest salinity and highest temperature. Oxygen contents of the surface waters are almost identical for the three areas.

The sharp salinity increase toward the salinity maximum layer (about 100-200 m. depth) produces a highly stabilized stratification.

Fig. 3 - Surface oxygen distribution (ml./l.).

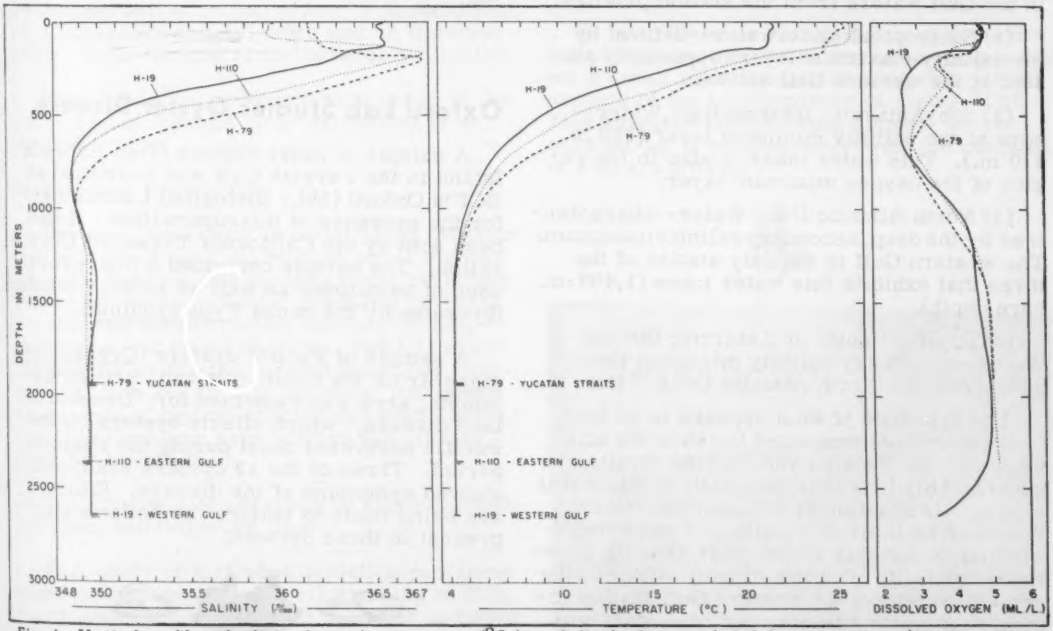



Fig. 4 - Vertical profiles of salinity (p.p.t.), temperature (°C.), and dissolved oxygen (ml./l.) representative of major marine areas of the Gulf of Mexico. See fig. 2 for station locations.

Because the high salinity water within and below this layer cannot come in contact with the air, the decrease in oxygen is pronounced through the layer. The western Gulf station has no significant subsurface salinity maximum, but a strong temperature gradient exists (about 150 m.), which has the same effect on stability.

The following points, apparent from the vertical profiles, help to interpret the surface circulations.

(1) In the western Gulf:

(a) If water is upwelling (as with a counterclockwise curving flow--surface divergence), low-temperature, low-salinity water is brought toward the surface.

(b) With convergent flow, warm, high-salinity water is collected.

(2) In the eastern Gulf:

(a) Surface divergence brings high-salinity, low-temperature water to the surface.

(b) Surface convergence acts to collect the low-salinity, warm water.

As many as four water masses are evident in the Gulf waters from the station profiles.

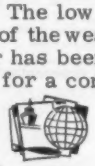
(1) Subtropical Underwater--defined by the salinity maximum layer (apparently absent at the western Gulf station).

(2) Sub-Antarctic Intermediate Water--core at the salinity minimum layer (750 to 950 m.). This water mass is also in the region of the oxygen minimum layer.

(3) North Atlantic Deep Water--characterized by the deep, secondary salinity maximum. The western Gulf is the only station of the three that exhibits this water mass (1,400-m. core depth).

(4) North Atlantic or Antarctic Bottom Water--secondary salinity minimum layer underlying the North Atlantic Deep Water.

The presence of what appears to be bottom water was unexpected because the sill depths of the Yucatan and Florida Straits are considerably less than the depth of this water mass. Examination of the deep waters at the other stations is required to determine whether or not this water mass is truly present in the Gulf. The low oxygen values in the deepest waters of the western Gulf station indicate the water has been out of contact with the atmosphere for a considerable time.



## Complete Two-Year Bottom Temperature Record off Cape Cod

On July 19 and 20, scientists of BCF's Environmental Oceanographic Research Program, Washington, D. C., made the final recovery of temperature recorders maintained for 2 years at 5 locations on the bottom off Cape Cod. The instruments, self-contained and designed to run 400 days, were recessed in 12,000-pound mooring blocks of navigation type buoys. The buoys, now retrieved, were specially established by the U. S. Coast Guard along a profile extending from 6 to 29 fathoms.

This instrument work had two objectives: (1) to obtain "continuous" temperature records with which to correlate the bathymetric ranges, times of reproduction, growth rates, etc., of benthonic (sea bottom) invertebrates along the profile, and (2) to develop a reliable method to put recording instruments on the continental shelf fishing grounds. Temperature data recovery from the 5 stations was about 80 percent during the first-year--better than usual for recording instruments at sea.

## Oxford Lab Studies Oyster Disease

A sample of pearl oysters from Bahrein Island in the Persian Gulf was examined at BCF's Oxford (Md.) Biological Laboratory for the presence of microparasites. It had been sent by the California Texas Oil Corporation. The sample contained a high prevalence of nematodes as well as larval cestodes (presumably the genus Tylocephalum).

A sample of Pacific oysters (Crassostrea gigas) from the Denman Island, British Columbia, area was examined for "Denman Island disease," which affects oysters on the Pacific northwest coast during the summer period. Three of the 12 oysters examined showed symptoms of the disease. Efforts are being made to culture the "microcells" present in these oysters.

# Oxidative Changes Are Being Investigated at New Food Science Pioneer Research Laboratory

By Maurice E. Stansby*

The Food Science Pioneer Research Laboratory, established in July 1966 at Seattle, is conducting research primarily in the field of oxidative changes in fishery products. Although bacterial spoilage is the chief cause of the deterioration of fish, advances in refrigeration and the development of newer techniques of preservation such as irradiation pasteurization, give promise that, before long, bacterial spoilage will be a minor problem for the fishing industry. Yet these same advances in technology of fish preservation greatly increase damage caused by oxidation. Both frozen and irradiation preservation increase rather than decrease the tendency for fish oils to oxidize.

The development of antioxidants useful for other foods has not solved this problem for fishery products because of the much greater instability of the chemical components in fish. Oxidation leads to loss of original normal flavors, leaving the fish almost tasteless. Prolonged oxidation can result in development of unpleasant rancid flavors and in discoloration. Even texture can be adversely affected.

Many oxidation problems also occur in the utilization of the oils after extraction from the fish.

## Seeks Basic Knowledge

The new laboratory is undertaking projects that will yield basic knowledge about the way fish oils oxidize and the way these reactions can be controlled. Initial research is being carried out mainly on two species of fish--menhaden and silver salmon. The former represents by far the largest source of commercial fish oil in this country; the latter represents a typical species for which oxidation problems are severe when the fish is used for human food.

The program of research is being carried out along the following lines:

1. A study of just what oxidation problems exist during the commercial handling of fish. Particular attention is paid to flavor and odor changes.

2. A study of the mechanism of oxidation of fish.

3. A study to determine what role bacteria play in oxidation of fish oils when bacterial spoilage is going on simultaneously with oxidation of the oils.

4. A study of antioxidants that are to be used with fish oil both while in fish and after extraction from the fish.

5. An investigation of the mechanism of oxidation of fish oils which have been incorporated into paint. When paint in which fish oil is incorporated dries, as a result of oxidation an undersirable change takes place simultaneously resulting in development of "fishy" odors. An investigation of the mechanisms of these two kinds of oxidation is aimed at controlling the latter at the same time permitting the desirable drying of the paint to take place.

6. In addition to the research on oxidative deterioration, the laboratory is about to carry out a small investigation dealing with certain aspects of the biochemistry of living fish. This investigation is being planned to be carried out in collaboration with the Division of Fishery Biology.

*Director, Food Science Pioneer Research Laboratory, Seattle, Washington.

## Year of Acquiring Oceanographic Data is Successful

BCF's Biological Laboratory at Stanford, Calif., completed a successful year of acquiring oceanographic data through an expendable bathythermograph (XBT) system. The system was aboard the Matson Line freighter "California." Since June 1966, the system has provided temperature-depth data for 19 trips between Honolulu and San Francisco, and 2 trips between Honolulu and Los Angeles.

The XBT data are transmitted from the vessel, through BCF radio station WWD, to the Navy's Fleet Numerical Weather Facility at Monterey, Calif., for operational use. Copies of the analog records are forwarded to the Navy Electronics Laboratory for research application, and to the National Oceanographic Data Center to become records. Temperature-depth sections for each crossing are constructed at the BCF Stanford Laboratory. The resulting time-series of sections are the first of this nature ever obtained. They are being analyzed, along with studies of changes in monthly mean sea level, to establish the character of temporal fluctuations of the California Current. Such fluctuations may be significant to fisheries of that region.

This project is considered an outstanding example of successful interagency and Government-industry cooperation.

## Fish Not Affected by Seismic Profiling "Sparkers"

A biologist of BCF's Biological Laboratory, Woods Hole, Mass., has participated in an experiment to study the effect of a 120,000 Joule spark discharge system, used for seismic profiling, on a known concentration of fish off the New England coast. After a concentration of cod was located at 18-20 fathoms on Nantucket Shoals, a flag buoy was placed, and the "sparker" discharged about 50 times in the vicinity.

Codfish, mussels, and sea lemons taken within a 2-hour period following the discharges were dissected and examined. All organs appeared normal. There was no sign of dead or injured fish at the surface. A recheck of the area 2 days later showed that fish were still present, and there were no abnormalities apparent in specimens dissected.

## Develop New Handling Techniques for Catfish

An improved method for pumping live catfish from a floating live box to a holding tank has been developed by the Ann Arbor (Mich.) Gear Research Program staff. About 500 pounds of catfish were pumped into a vacuum tank and held for 2 hours; there was no mortality. Also, a unique holding net was tried into which catfish entered readily from a haul seine net.

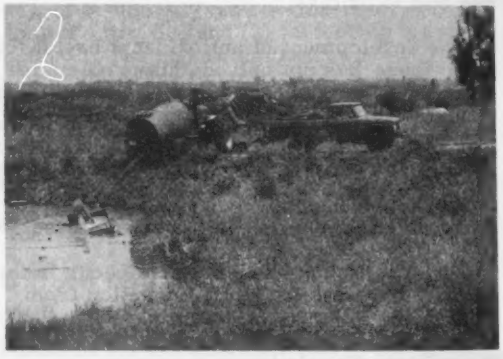


Fig. 1 - Combination vacuum tank-fish pump developed by BCF for pumping live catfish from haul seine.

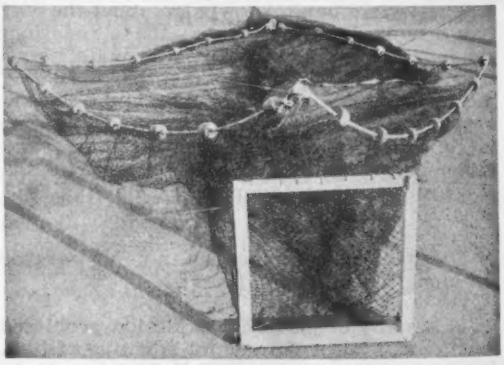


Fig. 2 - Detachable bag section used in conjunction with haul seine to hold catfish.

These techniques may be a breakthrough in the present difficult area of handling live fish from seine to shoreside containers in commercial operations. They may greatly reduce the mortality rate.

In the first trial, over 3,000 pounds of catfish were isolated and held without the fish showing signs of distress. The tests were conducted on a 40-acre pond near Yazoo City, Mississippi, and at Stuttgart Fish Farming Experimental Station in Arkansas.

## Gloucester Lab Designs Eviscerator

BCF's Gloucester (Mass.) Technological Laboratory has applied for a patent on a device that automatically eviscerates fish, flush-washes the empty visceral area and packs the washed cavity with a refrigerant, such as ice. These operations are carried out "without cutting or otherwise damaging the fish."

The Gloucester scientists believe the eviscerator would be useful both to the commercial fishing industry and to fishing party boats.

## Firms Request Continuous USDI Inspection

Three large fish-processing firms have applied for continuous inspection service by the U. S. Department of the Interior. The Sea Pak Corporation, Division of W. R. Grace and Company, requested inspection at its newly constructed plant on St. Simons Island, Georgia. Precooked and raw breaded fish sticks and portions will be the main products produced and inspected. The firm already has on the island a large facility that produces breaded shrimp.

The O'Donnell-Usen Fisheries Corp. requested the USDI service at its plant in Gloucester, Mass. The firm, which already has one plant under continuous inspection, produces primarily breaded fish sticks, portions, and frozen seafood dinners.

Booth Fisheries, a Division of Consolidated Foods, is completing construction of a processing plant in Portsmouth, New Hampshire. Many fishery products will be produced there. Booth also has a plant in St. Louis, Missouri, where much of the production of fish sticks and portions is USDI inspected.

USDI inspection at these 3 large plants will increase significantly the volume of inspected products available to the consumer.

## Find Fewer Parasites in Pacific Hake

Scientists of BCF's Seattle Technological Laboratory report a significant reduction in the number of Pacific hake found infested with a near microscopic protozoan parasite. Before U. S. and Soviet fishermen began to harvest these fish on a large scale several years ago, 50 to 90 percent of the fish were found to contain the parasite, and 10 percent were heavily infested.

This year, as testing began for the third consecutive summer, a reduction in infestation was noted. Only 30 percent of the fish were infested, and only 3 percent heavily. Some suggest this reduction resulted from the removal from the fishing grounds and replacement by young fish of the older and mature fish. The latter had been in contact with the parasites for a longer time.

The parasite, a myxosporidian harmless to man, appears to cause no problem for the fish in its natural environment. But after the fish dies, the parasite releases an enzyme that softens the flesh and makes it less useful and desirable as food.

# FEDERAL ACTIONS

## Interior Department

### $4 MILLION MADE AVAILABLE FOR ANADROMOUS FISHERIES PROJECTS

More than $4 million in Federal funds have become available to the states for anadromous fishery projects during fiscal 1968, Interior Department has announced.

Anadromous fish ascend rivers from the sea to spawn. They include salmon, striped bass, and shad. The Anadromous Fish Act, administered by BCF and the Bureau of Sport Fisheries and Wildlife, awards money for cooperative projects that will benefit these fish.

The money will be used to improve spawning areas, install fishways, construct fish protection devices and hatcheries, and to conduct research to improve management and increase stocks.

Under the 1965 law, Federal money may be used to finance up to 50 percent of approved state projects. Federal appropriations up to $25 million are authorized through June 30, 1970.

* * *

### TASK FORCE WILL INVESTIGATE OVERFERTILIZATION OF LAKES

Secretary of the Interior Stewart L. Udall and E. Scott Pattison, President of the Soap and Detergent Association, named a 13-man task force in August to recommend a cooperative research program for controlling eutrophication (overfertilization) of lakes.

Eutrophication is the excessive fertilization of algae and other aquatic plants with nutrients, principally nitrates and phosphates. Phosphate is a common element in municipal sewage, human waste, agricultural fertilizers, detergents, and industrial discharges.

As the public uses more nutrients, aquatic plants increase and die. Organic deposits pile up on the lake bottom. The lake becomes smaller, shallower, warmer, and organic decay depletes the supply of oxygen. It becomes a marsh and eventually disappears. Lake Erie is an example of serious eutrophication in the U. S. There, much of the oxygen has disappeared and aquatic plants are filling the lake.

#### Industry Enlisted to Help

The help of many industries is being enlisted by the Department of the Interior in solving the problem. The industries include fertilizer, chemical, phosphate, agriculture, and others that discharge wastes containing phosphates and nitrates.

The task force will recommend a broad research program that may be initiated by Government and industry.

* * *

### TASK FORCE OFFERS PLAN TO EASE ALEWIFE PROBLEM

A Federal task force named by Interior Secretary Stewart L. Udall to study the alewife problem in the Great Lakes has recommended a remedial plan.

In recent years, the vast annual death of alewives has clogged water systems and covered beaches. In spring and summer 1967, millions of dead alewives drifted onto Lake Michigan beaches--forcing out some homeowners, drastically reducing tourist trade, and producing an expensive cleanup condition.

The program proposed by the task force on September 21 seeks to ease the immediate problem and go on to make the lakes completely useful again. Lake Michigan would receive attention first. The group is headed by Dr. Stanley A. Cain, Assistant Secretary for Fish and Wildlife and Parks.

#### 3-Stage Program

The plan proposed has 3 stages:

1. Measure the alewive population, predict the amount and place of the enormous annual deaths, and determine the causes.

2. Find methods to remove efficiently the vast carpet of dead fish from the lakes and shores.

3. Reduce the alewife population and restore a balance of native and new fish species.

Federal and State Cooperation Necessary

The task force believes that Federal and State cooperation will be necessary to achieve the goal. It recommends that the joint U. S.-Canadian Great Lakes Fishery Commission--which coordinates fishery development in the lakes--participate actively. Federal aid programs would increase state efforts.

In addition to Dr. Cain, task force members are: Frank C. Di Luzio, Assistant Secretary for Water Pollution Control; Commissioner James M. Quigley, Water Pollution Control Administration; Director H. E. Crowther, BCF; Director John S. Gottschalk, Bureau of Sport Fisheries and Wildlife; and Dr. Milner B. Schaefer, Science Advisor to Secretary Udall.

* * *

PROPOSE IMPORT CURBS ON TROUT-LIKE FISH OR EGGS

A proposed amendment to the Code of Federal Regulations, Importation of Wildlife or Eggs Thereof, was published by Interior Department's Bureau of Sport Fisheries and Wildlife in the "Federal Register" on July 27. The amendment would prohibit import of wild birds or their eggs. It also includes salmonids of the fish family Salmonidae, which embraces all species of fresh and frozen trout and fresh and frozen Atlantic and Pacific salmon.

Certificate Required

The proposed amendment prohibits import into the U. S. of all live or dead fish, or eggs of salmonids of the family Salmonidae, unless these imports are accompanied by a certificate signed by selected officials in country of origin or in U. S., that the products are free of viral and bacterial diseases and parasitic infections.

Extend Time for Comments

A period of 60 days from July 27 was provided within which persons might file written comments, suggestions, and objections with the Director, Bureau of Sport Fisheries and Wildlife, Washington, D. C. 20240. This period has been extended to November 30.

## Federal Trade Commission

PROPOSED GUIDES FOR DOG AND CAT FOOD INDUSTRY PUBLISHED

The Federal Trade Commission published a notice of Proposed Rule Making in the "Federal Register" September 16 to guide the Dog and Cat Food Industry.

The proposed guides include sections on: (1) Definitions; (2) Misuse of terms; (3) Grade or quality misrepresentation; (4) Misuse of terms "can" and "canned"; (5) Deceptive pricing.

The definitions include:

(u) "Fish" is the clean, acceptable, fresh flesh and incidental bone of any fish, freed of the head, scales, fins, and viscera. When canned, all bone should be cooked to a soft consistency.

(v) "Whole fish" is clean, acceptable, whole, fresh, fish (unscaled and uneviscerated), under 19 inches in length. Larger fish should be freed of their heads, viscera, scales, and fins, and described as fish. When canned, all bone should be cooked to a soft consistency.

(w) "Fish meal" is finely ground, dry, rendered fish or whole fish.

(x) "Chowder" is acceptable, thick seafood soup or stew containing at least 30 percent of the type of seafood specified in advertisements and on labels.

# INTERNATIONAL

## U. S. and Soviet Vessels Conduct Joint Fishery Research in Atlantic

Two vessels named "Albatross"--the U.S. "Albatross IV" of BCF's Biological Laboratory in Woods Hole, Massachusetts, and the Soviet "Albatros"--are cruising the mid-Atlantic between Woods Hole and Cape Hatteras, North Carolina, in a joint fishery project that will acquire important information about the resources of that area. The project was arranged during bilateral meetings held in Boston last June. This joint cruise continues the international cooperative work started when the Soviet Albatros arrived in Woods Hole on September 11.

Fig. 1 - The Albatross IV, research vessel of BCF. (Photo: Robert K. Brigham.)

The vessels have been engaged in two different ventures:

The first concerns a study of the survival of the early stages (eggs and larvae) of important commercial species of fish in the Georges Bank area. The International Commission for the Northwest Atlantic Fisheries (ICNAF) has been planning such a study for years. Eventually, it will involve the participation of vessels from member countries in an intensive plankton survey of the Georges Bank area. The purpose of the recent joint cruise was to standardize collecting equipment, methods of collection, and analysis of samples so that results of future surveys by the two countries will be directly comparable.

### Groundfish Surveys

The second phase of this joint work consists of groundfish surveys between Cape Cod, Massachusetts, and Cape Hatteras, North Carolina. The work was planned during last June's Boston meetings. The Soviet fleet is fishing this area intensively. The two countries decided that assessment of the effect of their fishing on the stocks of silver hake, red hake, scup, and fluke required more scientific information. They agreed on a cooperative program to obtain the information.

### The Cruises

The Soviet vessel arrived at Woods Hole on September 11. After a week of scientific

discussions, the two vessels departed on a one-week plankton cruise. All goals were achieved. The two vessels than exchanged trawl nets and left on September 28 for a two-day shakedown cruise. Then, following an exchange of several scientists, the two set out on the first of their two 10-day cruises. Biologists from a number of Atlantic States also were aboard.

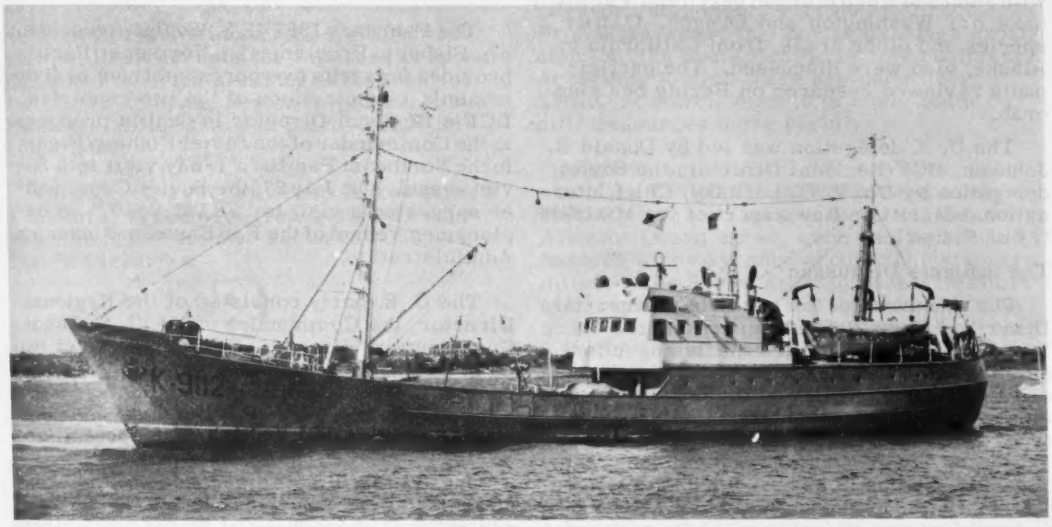


Fig. 2 - The Soviet Albatros. (Photo: Robert K. Brigham.)

Importance of Project

Dr. Herbert W. Graham, Laboratory Director, BCF's Biological Laboratory, Woods Hole, said: "The fishery resources of the Georges Bank area are being fished more intensively each year by more and more countries. Last year the Soviet Union harvested more tonnage from the area than any other country. The wise management of this resource requires a thorough knowledge of the biology of the fishes concerned and the effects of fishing on the populations. Through ICNAF the member countries have been submitting statistics and biological information on their catches and carrying out scientific surveys. However, this is the first time two countries have worked so closely together to get an absolute comparison of the methods used; this will be extremely valuable in all future work conducted by their research vessels."

The Two Vessels

The Albatross IV is a 187-foot, single-screw, stern trawler that carries a crew of 19 and 6-8 scientists. It serves as an all-season base for fisheries and physical oceanographic research in the Northwest Atlantic.

The Soviet Albatros is a 165-foot, gray-hulled, converted side trawler. She reminds old Woods Hole hands of the U. S. "Albatross III". The Albatros is a scouting vessel that works with a fishing fleet. She carries 31 persons, including 8 scientists.

Chief Soviet scientist is Arkady Noskov. He and Dr. Robert L. Edwards, Assistant Director of BCF Woods Hole, met during past international fishing negotiations in Moscow.

## U. S. and USSR Hold Fishery Talks

Fisheries experts of the U. S. and the Soviet Union met in Seattle, July 19-28, to discuss the exchange of statistics and scientific data and to plan cooperative research on species of common interest in the Northeastern Pacific Ocean.

The conference was concerned primarily with stocks of Pacific ocean perch and Pacific hake off Washington and Oregon. Other species and other areas, from California to Alaska, also were discussed. The participants reviewed research on Bering Sea king crab.

The U. S. delegation was led by Donald R. Johnson, BCF Regional Director; the Soviet delegation by Dr. V. G. Lafitsky, Chief International Maritime Law expert of the Ministry of Fisheries.

The Subjects Discussed

The scientists of the two delegations: (1) Described their statistical systems for collecting and recording catch and fishing-effort data for the trawl fisheries of the Northeastern Pacific. (2) Reviewed the principal species of groundfish caught, the fishing areas, types of vessels and gear used, biological aspects of the groundfish species taken, and research studies in progress. (3) Exchanged information on methods used to estimate size and maximum sustainable yield of stocks of Pacific ocean perch and Pacific hake off Washington and Oregon, and of king crab in the Bering Sea.

Agree on Recommendations

Based on the discussions, the experts agreed on recommendations concerning exchange of fishery statistics and biological data and coordinated research. The recommendations will be submitted to the appropriate agencies of the U. S. and USSR for review and approval.

The recommendations define proposed areas for reporting fishery statistics; species to be reported; time periods; categories of vessel and gear combinations; depth intervals to be used; sampling procedures; and biological measurements.

Also proposed are coordinated research on size of hake stocks; spawning behavior of hake; methods of determining age of ocean perch and hake; relative fishing power of each vessel-gear combination in trawl fisheries of the 2 countries; abundance of juvenile king crab; and exchange of scientists between research vessels.

## U. S. and USSR Exchange Vessel Visits

The February 1967 U. S.-Soviet Agreement on Fishery Problems in Northeast Pacific provides for visits by representatives of fishermen's organizations of the two countries. BCF's Regional Director in Seattle proposed to the Commander of the Soviet Fishing Fleets in the Northeast Pacific a 1-day visit to a Soviet vessel. On July 27, the Soviet Commander suggested a visit to "SRTM-8410," an exploratory vessel of the Far Eastern Fisheries Administration.

The U. S. party consisted of the Regional Director, the Commander of the U. S. Coast Guard cutter "Yocona," the presidents of two U. S. fishery associations, and a BCF interpreter. Soviet hosts were Commander E. I. Andriushchenke, his deputy, the captain of the Soviet vessel, and a fishing gear specialist.

One of the subjects discussed was the complaints of U. S. fishermen about dangerous navigational procedures of Soviet fishing captains. The Soviet Commander replied that part of the problem may be that "Soviet fishermen are curious to see how U. S. fishermen fish." He said "he would appreciate it if in the future notices of violations committed by Soviet vessels would be passed on to him rather than to the Soviet Government."

On August 3, the Soviets visited the U. S. commercial fishing vessel "Western."

## Soviet-Japanese Talks Held in Moscow

Japanese Foreign Minister Takeo Miki discussed the "fisheries question" several times during his visit to Moscow in late July. Miki and Kuznetsov, Acting Soviet Minister of Foreign Affairs, took up "fishery problems" in addition to "China and Vietnam." No details are available.

On July 22, during a ceremonial visit to the Kremlin, Miki renewed an earlier Japanese proposal for a bipartite meeting in October 1967 to discuss: (1) safety of Japanese fishermen operating north of Japan--where the Soviets, over the years, have arrested dozens of them; (2) renegotiation of the USSR-Japan Northwest Pacific Fisheries Treaty; and (3) joint fisheries research in the Sea of Okhotsk.

Soviet Prime Minister Kosygin replied that the USSR accepts the Japanese proposal and that Fisheries Minister Ishkov will be the chairman of the Soviet delegation to the meeting. Exact date and place will be decided later.

On July 24, 1967, Miki and Ishkov signed a bilateral agreement (renegotiated every year) on Scientific and Technical Cooperation in Fisheries.

## Japan Supervises Her Nationals' Fishing off New Zealand

The Japanese Fisheries Agency's research vessel "Hakuho Maru" left Tokyo August 10 to guide and supervise Japanese vessel operations within New Zealand's 6-12 mile fishing zone. This is to ensure smooth administration of the recently concluded Japan-New Zealand fishery agreement, which provides for continued Japanese fishing within this zone. ("Minato Shimbun," August 4.)

## Norway and Denmark Ratify Agreement on Fishing off Greenland

Denmark and Norway have ratified the agreement (negotiated April 20) on fishing off Greenland. The agreement, now in force, gives Norwegian citizens the same fishing rights as Danish citizens in the fisheries off Greenland's east coast.

These rights will be maintained for the next 5 years. They will be continued for 5 more years if there is no demonstrable damage to fisheries of the native Greenlanders. (U. S. Embassy, Copenhagen.)

## New Zealand and Australia Concerned over Soviet Southwest Pacific Fishing

Australia and New Zealand are concerned over the implications of extensive Soviet fisheries research off their coasts. The research is being conducted by the Pacific Research Institute for Fisheries and Oceanography (TINRO).

New Zealand newspapers have quoted a "Pravda" statement by TINRO's Director, Prof. Kizevetter, that Soviet fisheries expansion into the South Pacific is only beginning. According to him, there are not enough TINRO research vessels to study South Pacific resources more rapidly.

For the entire Pacific Ocean area, each available TINRO vessel would have to survey 800,000 square miles; to cover the entire Atlantic Ocean area, each vessel would have to survey only about 200,000 square miles. The Soviet Atlantic research effort (judging by the number of vessels alone) is about 4 times that in the Pacific. Since the Soviet Atlantic fisheries produce only about 40 percent more than the Pacific, the imbalance is obvious.

### The Soviet Position

New Zealand journalists contacted the Soviet Legation in Wellington to obtain more information. The Soviet reply was that "we exploit marine resources in all of the oceans because we need them." However, the First Secretary of the Embassy added that Soviet captains have received strict orders to respect New Zealand's new 12-mile fishery limits.

In Australia, J. C. Wharton, Deputy Director of the Victoria Fisheries and Wildlife Department, told newsmen that after TINRO's extensive research off Australia "the Soviet Union knows more about Australian fishing grounds than does Australia."

Since the summer of 1966, at least 3 research vessels (the "Akademik Berg," "Seskar," and "Iskona") accompanied by up to 10 exploratory research vessels have continuously conducted fishery investigations off Australia.

### Soviet Landings

Soviet landings of fishery products from the Pacific and Indian Oceans (including Ant-

arctic whaling) were 2.05 million metric tons in 1966. By 1970, those landings are expected to increase to 3.1 million tons--over 50 percent greater.

## EFTA May Liberalize Fish Trade

Depending on the findings of a working party, the European Free Trade Association (EFTA) may liberalize trade in fish and other marine products among its member nations. Ministers of EFTA agreed to review the situation during their 1966 meeting in Lisbon. The working party met for the first time in May 1967 and agreed to discuss at its next meeting the ideas for liberalizing trade suggested by its members. The group must make its recommendations to the Ministers before the end of 1967. ("Seventh Annual Report on the European Free Trade Association," Sept. 1967.)

EFTA Landings Almost 10% of World Catch

EFTA members include Austria, Denmark, Finland, Norway, Portugal, Sweden, Switzerland, the United Kingdom; Finland is an associate. Their fishery landings represent almost 10 percent of world fish production and more than 50 percent of catches in Western European countries. EFTA's share of world catches has been declining in recent years. Norway is EFTA's biggest producer, followed by the United Kingdom, Denmark, Portugal, and Sweden.

## Antarctic Whale Oil Output Declines in 1966/67 Season

Production of baleen whale oil in the 1966/67 Antarctic pelagic season--December 12, 1966-April 7, 1967--is provisionally estimated at 71,155 short tons. It was 83,955 in 1965/66 and 158,244 tons in 1964/65.

Production data for sperm whale oil are not yet complete, but output by Japan and Norway declined 16 percent. Total production will likely be markedly below the 59,232 tons produced in 1964/65.

Production of Whale Oil in the Antarctic Pelagic Season[1]

| | Baleen Oil | | Sperm Oil[2] | |
|---|---|---|---|---|
| | [3]1966/67 | 1965/66 | [3]1966/67 | 1965/66 |
| | (Short Tons) | | | |
| Japan | 34,222 | 44,589 | 2,203 | 2,849 |
| Soviet Union | [4]22,035 | 21,317 | [5] | 34,676 |
| Norway | 14,898 | 18,049 | 4,966 | 5,707 |
| Total | 71,155 | 83,955 | [5] | 43,232 |

1/Converted from original unit at rate of 170 kilograms, or 374.7820 pounds of oil, per barrel.
2/Including catch of sperm whales north of latitude 40° S. on voyage to and from Antarctic.
3/Preliminary.
4/Estimate based on catch of 1,069 blue whale units, with assumed outturn of 110 barrels of oil per blue whale unit.
5/Not available.
Source: "Norwegian Whale Gazette," Oslo.

Antarctic Catch 3,503 BWUs

The total Antarctic catch this season amounted to 3,503 blue whale units (BWU). Based on official figures, baleen whale oil output by Japan declined. Norway's output also declined as a result of reduced oil yield per BWU caught. Soviet output is estimated to have increased; however, actual production has not yet been reported officially.

During the 1966/67 Antarctic pelagic season, 9 factoryships and 120 catcher boats were in operation--1 less factoryship and 8 fewer catcher boats than in the previous season. ("Foreign Agriculture," May 29, U. S. Dept. of Agriculture.)

## Symposium on African Continental Shelf Fisheries Is Rescheduled

The Symposium on the Living Resources of the African Atlantic Continental Shelf, scheduled originally for June 1967 in Madrid, was rescheduled for Santa Cruz de Teneriffe, Canary Islands, March 25-28, 1968. The symposium will be held under the auspices of the International Council for the Exploration of the Sea (ICES), with FAO support. Its purpose will be to establish the state of trawlable fish stocks and their fisheries (including fishing effort) between Gibraltar and Dakar, Senegal.

Papers on all aspects of fishing in the area--in French or English--are being sought.

Symposium will include sessions on (1) general faunistics of the area; (2) physical oceanography; (3) plankton; (4) crustacea and mollusca; (5) fishes; (6) stock assessment and statistics; and (7) fishing and utilization of the catch. (U. S. Embassy, Copenhagen, Aug. 2.)

Note: Titles of contributions should be submitted to the Convenor of the Symposium by November 1, 1967. For more information, write the Convenor: R. Letaconnoux, 59 Avenue Raymond-Poincare, Paris 16eme, France.

## FAO Council Recommends New Indian Ocean Commission

At its 48th Session in June, the FAO Council recommended establishment of a new "Indian Ocean Fishery Commission" to develop and use the area's fishery resources. The Council also recommended that regional fisheries commissions be defined in relation to sea areas, rather than by land areas, as they are now. This change would allow all nations interested in a fishery area to join the regional "sea-area" commission. At its meeting in April 1967, most members of the FAO Committee on Fisheries recognized the need for this change to facilitate conservation. Final approval of these proposals rests with the 114-nation FAO Conference, which meets in November.

## Undersea Telephone Cables Buried

In "Operation Sea Plow," the American Telephone and Telegraph Company is burying the shore-end sections of transatlantic undersea cables beneath the ocean floor to prevent their damage by fishing vessels. Occasionally ocean cables have been broken or damaged by fishing gear, undersea slides, icebergs, currents, and rough ocean bottom conditions. Despite the fishing industry's cooperation, almost 90 percent of all cable breaks along the Continental Shelf were caused by commercial fishing vessels.

When breaks in the high-capacity cable to Great Britain occurred off New Jersey, AT&T decided to bury the cables with a "sea plow." The plow weighs 27,000 pounds and is towed by a ship at 0.5 to 1.5 knots on 4 runners. The cost was about $2 million, but AT&T expects the program to produce substantial future savings by reducing costs in cable patrol and repair work. (AT&T, July 20.)

Tried Education Campaign

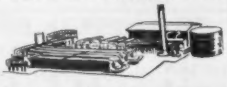
AT&T several years ago began a program of educating fishermen on how to protect the undersea cables. It mass-distributed to U. S. fishermen maps of the Atlantic and Pacific Oceans indicating the precise locations of the cables. In 1966, maps in Russian also were printed and distributed via AT&T barges and patrol vessels to any Soviet fishing vessel encountered in the Atlantic. Apparently, this was not totally successful, and the company decided to bury the cables.

## Ecuador Will Withdraw from Tuna Commission

Ecuador has notified the U. S., the depository government, of its intention to withdraw from the Inter-American Tropical Tuna Commission. Its note, dated August 18, 1967, indicated that in accordance with the provisions of the Tuna Convention the withdrawal will be effective 1 year from the date it is received.

## BCF-Operated Irradiator Becomes International Training Facility

The BCF-operated Marine Products Development Irradiator in Gloucester, Massachusetts, has been selected by the International Atomic Energy Agency (Vienna, Austria) as an approved training facility for workers in the food irradiation field.



## Food and Agriculture Organization

SEMINAR HELD
ABOARD SOVIET VESSEL

On June 15, the 3,730-gross-ton "Akademik Knipovich," the largest Soviet fisheries research vessel, left Odessa with 20 fisheries experts from developing countries for an FAO-sponsored high-seas seminar in advanced methods of fisheries research. Aboard were bio-

logists, gear specialists, and technologists from Kenya, Dahomey, Tunisia, Pakistan, India, and other countries. The vessel operated mostly in the Mediterranean Sea. She stopped in Varna, Bulgaria, and Istanbul, Turkey, where fish-processing enterprises and marine laboratories were visited. Leader of the seminar was Professor P. A. Moiseev, Deputy Director for Biological Research of VNIRO.

## FEO Fish Meal Output Up Slightly

Fish meal production of member countries of the Fish Meal Exporters' Organization (FEO), which supplies about 90 percent of world exports, was up slightly in first-half 1967 over the 1966 period.

| Country | June | | Jan.-June | |
|---|---|---|---|---|
| | 1967 | 1966 | 1967 | 1966 |
| | (Metric Tons) | | | |
| Chile | 1/ | 19.7 | 3/50.5 | 135.5 |
| Angola | 1/ | 3.0 | 2/14.6 | 23.5 |
| Iceland | 11.7 | 19.1 | 44.8 | 60.6 |
| Norway | 60.7 | 56.7 | 282.3 | 232.1 |
| Peru | 1/ | .5 | 3/998.5 | 968.9 |
| So. Africa (including S.-W. Africa) | 33.9 | 47.0 | 215.4 | 176.8 |
| Total | 326.7 | 146.0 | 1,606.1 | 1,597.4 |

1/Not available.
2/Data for Jan.-Apr. 1967 only.
3/Data for Jan.-May 1967 only.

The current fishing season for anchovy in Peru ended June 15; it was likely that the 1966/67 anchovy catch would reach 8.5 million metric tons. The new fishing season was expected to open Sept. 1, or soon after.

Exports of FEO countries were:

| Country | Mar. | | Apr. | | May | | June | | Jan.-June | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1967 | 1966 | 1967 | 1966 | 1967 | 1966 | 1967 | 1966 | 1967 | 1966 |
| | (1,000 Metric Tons) | | | | | | | | | |
| Chile | 12.8 | 23.9 | 19.8 | 16.1 | 7.3 | 12.5 | 4.4 | 11.9 | 54.6 | 91.2 |
| Angola | 1.4 | 3.4 | 6.7 | 3.2 | 1/ | 5.3 | 1/ | 2.5 | 2/16.1 | 22.7 |
| Iceland | 12.0 | 7.7 | 11.3 | 13.7 | 13.2 | 8.4 | 5.3 | 9.2 | 72.1 | 65.2 |
| Norway | 3/ 30.4 | 24.2 | 31.2 | 15.4 | 83.8 | 14.0 | 53.7 | 21.4 | 4/222.1 | 112.3 |
| Peru | 117.3 | 137.7 | 118.4 | 118.6 | 158.7 | 107.5 | 1/ | 120.6 | 884.0 | 747.4 |
| S. Africa | 16.7 | 12.0 | 18.4 | 14.5 | 52.7 | 17.6 | 28.2 | 19.2 | 123.4 | 73.9 |

1/Not available.
2/Data only for Jan.-Apr. 1967.
3/Herring meal only.
4/Total to July 15, 1967, was 245.8 tons.
5/Data for Jan.-July 1967.

World Fish Meal Production Rises

World fish meal production from January through May 1967 was higher than in the 1966 period. Higher production in Norway, Peru, South Africa, and Denmark offset lower output in Chile, United Kingdom, Iceland, and Angola.

## World Fish Meal Trade Increased in 1966

World fish meal exports, including the meal equivalent of fish solubles, increased to 2.6 million short tons in 1966--164,600 tons higher than 1965 and 43 percent above the 1960-64 average. The increase chiefly reflected record Chilean exports. Recovery from the reduced 1965 Peruvian exports, plus increases in exports from Norway and Iceland, accented this increase. Exports from South Africa declined substantially for the second consecutive year.

A sharp rise in production in the major producing countries (Peru, Chile, Norway, and Iceland) resulted in larger supplies in world markets. Prices fell sharply as stocks increased. To correct the situation, fishing in Norway was stopped in November and December 1966. In Peru, an industry-wide strike took place November 1-December 14. In February 1967, the Peruvian Government prohibited anchovy fishing during February 15-March 14, and on Saturdays and Sundays throughout the season. Despite these restrictions, stocks in the major producing countries continued to rise.

U. S. Becomes World's No. 1 Importer

Imports into specified countries in 1966 increased by 65,300 tons from 1965 and were only slightly less than 1964's record high. The U. S. displaced West Germany as the world's major fish meal importer. U. S. imports, chiefly anchovy meal from Peru and Chile, increased by two-thirds and were about one-fifth of the total. Imports by EEC countries were 9 percent below 1965 and 1964. Imports by other European countries, chiefly the United Kingdom, declined while movements to East European countries continued upward. Japan's imports, up in recent years, declined by 15 percent in 1966. Mexican imports increased by more than one-half from 1965 and were at a new high in 1966.

Abundant supplies at price levels one-fourth below a year ago have stimulated the uptake by the major importing countries. In 1967, through April, U. S. imports of fish meal, including the meal equivalent of solubles, amounted to 211,809 tons--markedly above the 115,114 tons of the 1966 period. West Germany's imports in January-April rose to about 164,250 tons, compared with 127,600 tons in the 1966 period.

Based on current prospects of ample supplies from the major exporting countries, there is little likelihood of a significant price advance this season. Fish meal prices in European markets on a crude protein basis have been competitive with soybean meal prices since June 1966. ("World Agricultural Production and Trade," Statistical Report, July 1967, U. S. Department of Agriculture.)

## Fish Oil Output and Export in 1966 Set Record

World fish oil production set a record in 1966--16 percent above 1965 and 46 percent above the 1960-64 average. The increase was influenced chiefly by record outputs in Norway and Iceland and by some recovery from the reduced 1965 production in Peru and Chile. Other producing areas accounted for about 22 percent of the total, compared with 28 percent in 1965.

The 1966 fish oil output resulted in record exports of 13 percent above 1965 and 39 percent above the 1960-64 average. Most of this increase reflected record shipments of herring and mackerel oil from Norway and Iceland. Exports of anchovy oil from Peru approximated 1965's. Exports of menhaden oil from the U. S., and pilchard oil from South Africa, declined.

- U. S. supplies and exports (largely menhaden oil) declined as catch declined. The industry, which conducts its operations off mid-Atlantic coast, is concerned over the continuing decline.

- Peru's 1966 production recovered partially from the 1965 low. Despite the increase, supplies were significantly below 1965 and 1964. Exports, virtually all anchovy oil, increased slightly from 1965. Based on estimated build-up in stocks, and prospects of some increase in production this year, Peru's 1967 fish oil supply is expected to increase, perhaps to 220,000 tons.

Because of increased supplies, exports should expand. During January-April, Peru's fish oil exports were 118,052 short tons compared with only 25,398 tons in the 1966 period.

- Chile's production and exports of anchovy oil rose to new highs in 1966, following sharp decline in 1965. Apparently, the increase reflected a marked improvement in fishing.

- Iceland's production and exports in 1966 rose sharply above 1965 and more than doubled 1960-64 average. The increase reflected a marked increase in herring catch due to increased use of modern boats and fish-locating equipment. Exports of herring oil during January-April 1967 were 34,137 tons, compared with 40,560 tons in the 1966 period.

- Norway's fish oil production and exports set records. Exports were 5 times the 1960-64 average. This increase was due to increased fishing pressure by new vessels with purse-seining equipment. Because the sharp increase in supplies in 1966 resulted in lower oil prices, fishing was suspended in November and December. To reduce 1967 catch and raise oil prices, herring processors reduced their buying prices one-third from 1966. Herring oil production through April 1967 was 65,000 tons, compared with 36,300 tons in the 1966 period.

- South Africa (including South-West Africa) fish oil production and exports declined

again. Favorable fishing conditions for pilchard during early 1967 resulted in a catch substantially above the same 1966 period. Existing conservation measures offer little likelihood of sizable expansion in the near future.

Because of increased world supplies, fish oil prices since March 1966 declined significantly. They reached a low in April 1967 and have increased slightly since then. Unusually low prices for fish oil relative to competing oils increased consumption.

Much of the increased supplies of fish oil available in world markets is being absorbed in the United Kingdom, West Germany, the Netherlands, and France. Because of higher lard prices and a scarcity of whale oil, fish oil is being used more in margarine production in the United Kingdom. ("World Agricultural Production and Trade," Statistical Report, July 1967, U. S. Department of Agriculture.)

## Japanese-Peruvian Joint Whaling Venture Negotiated

The Japanese Nippon Kinkai Hogei and Peruvian interests signed a provisional contract early in September on a joint whaling venture in Peru. According to the plan, the Japanese firm will conduct whaling operations from the base at Paita, deliver its hauls to the Peruvian processors, and buy back the meat for shipment to Japan.

Upon approval of the venture by the Japanese Fisheries Agency and the Peruvian Government, the Japanese firm plans to send a 3,000-ton refrigerated vessel and 3 catcher boats "Tokachi Maru Nos. 7, 8, & 10," to Peru. The fleet will conduct exploratory operations until March 1968. ("Suisancho Nippo," Sept. 2.)

## Joint Japanese-U. S. Crab Venture in Alaska Slated

The Japanese fishing firm Nichiro Gyogyo and the trading firm Mitsubishi Shoji have concluded an agreement with a U. S. company to establish a joint crab-packing venture at Sand Point, Shumagin Island, Alaska. The new company, tentatively named Sand Point Packing Co., has capital of US$400,000; the U. S. company contributed 50 percent, Nichiro 30 percent, and Mitsubishi Shoji 20 percent.

The joint operation will use a 614-ton processing vessel, to be provided by the U.S. partners, to pack crabs purchased under contract from local fishermen. The new company is scheduled to begin operation in September.

This is the second joint venture of the three firms. The first was salmon packing operation at Orca, Alaska, set up in summer 1965. ("Suisan Tsushin," July 4.)

SHARK STILL A VILLAIN

One of the first records of a shark attack on man is recorded on a vase painted about 725 B.C. It shows a sharklike fish devouring a sailor. But it was not until the 16th century, when an English sea captain placed one of these fearsome fishes on display in London, that they came to be known as sharks. English sailors adopted the name from the German word "schurke," meaning villain. (From Sea Frontiers, copyright 1966 by The International Oceanographic Foundation, Miami, Florida.)

# FOREIGN

## Canada

### HOLDS CONFERENCE ON FISH PROTEIN CONCENTRATE

Canada is holding a conference on fish protein concentrate (FPC) Oct. 24-25 to deal with various aspects of production. Sponsored by the Federal-Provincial Atlantic Fisheries Committee (Federal and Atlantic provincial fisheries officials), the meeting is chaired by Deputy Minister of Fisheries Needler.

It is divided into 5 sessions: World Protein Situation, Canadian Raw Material Resources, Processing Technology, Standards of FPC, and Status of FPC Development. Scientists and specialists from the U. S., Canada, and FAO are participating in largest numbers, although other interested persons are attending.

The Industrial Development Service of the Department of Fisheries arranged the conference. (Canada's Dept. of Fisheries, Aug. 15.)

* * *

### EXTENDS PERIOD OF YELLOW PERCH PRICE STABILIZATION

On Aug. 10, the period was extended to March 31, 1968, for the stabilization price of 10 cents a pound for yellow perch caught by Canadian fishermen in Ontario waters. The original program, effective August 1966, ran until August 1967. During that period, the Fisheries Prices Support Board underwrote a price of 10 cents a pound for yellow perch, 8 inches long, or longer, of No. 1 quality. To maintain this price to Canadian fishermen, the Board purchased frozen round perch and perch fillets from Canadian processors at designated cold-storage locations.

The commercial marketing of these products from the 1967 production would normally be completed before the 1968 spring fishing begins. The extension will stabilize the price to fishermen for yellow perch during the fall fishing season of 1967. It will allow the Board to clear its holdings during the normal commercial marketing season.

### NEW INSURANCE PLAN IS AVAILABLE TO ONTARIO FISHING VESSEL OWNERS

Canadian commercial fishermen in Ontario may now buy insurance under the Province's Fishermen's Indemnity Plan.

Low-cost insurance is provided for vessels and equipment engaged in commercial fishing. Similar protection has been available to marine fishermen for a number of years. Coverage is provided for fishing vessels, shore installations such as net sheds and fishing gear stored in them, and for certain types of fixed fishing gear while in the water.

What Plan Provides

To be eligible, the appraised value of the vessel or shore installation and equipment may not exceed C$15,000. Premiums are one percent per annum of the appraised value of the asset. In the event of complete loss, benefits are 60 percent of the asset's value. In partial loss, there is a 30-percent deductible clause; then the Plan will pay up to 60 percent of the appraised value towards additional repairs.

The Plan provides insurance against collision, foundering, storm, stranding, fire, or any other recognized peril. Officers of the Department of Lands and Forests will act as agents and adjustors for the Plan. (Ontario Dept. of Lands & Forests, July 31.)

* * *

### PUSHES NEWFOUNDLAND FISHERIES RESETTLEMENT PROGRAM

If they volunteer to move from isolated communities to fisheries growth centers, Newfoundland families will be able to get Government grants of up to $6,200 under Federal-Provincial regulations approved June 20. The new regulations liberalize benefits under a program in effect since the early 1950s. Already, it has helped resettle about 11,500 people. (U. S. Consul, St. John's, Newfoundland.)

# LATIN AMERICA

## Peru

1967/68 ANCHOVY SEASON
BESET BY PROBLEMS

The 1967/68 anchovy fishing season began September 1. The Peruvian Government issued a decree on August 30 granting tax relief requested earlier by the industry. As late as August 21, several processors said they would keep their vessels in port until tax and other relief measures, including a cut in fishermen's wages, were granted to reduce production costs. The August 30 decree, in addition to reducing taxes for the next 12 months, authorized the Navy to limit purse seiner crews using a formula based on vessel size, efficiency, and other factors.

Fishermen are upset over the expected reduction in crew size, and processors claim the reliefs granted are insufficient. In at least one instance, fishermen have seized a plant and tried to operate it themselves. It is not clear which plants will operate this year, or which have commenced operation.

Stocks of fish meal on hand in late August were almost twice those held in August 1966, but reduced production in early September might reduce them to levels well below those of late September 1966. (U. S. Embassy, Lima, Aug. 23, 30, 31; Peruvian broadcasts.)

## Mexico

DEMAND GOOD FOR OCTOPUS

Mexico plans to export 6,000 metric tons of Gulf of Mexico octopus this year. This production was sparked by the demand from markets created by sample shipments to the U. S. and other countries. This development has been a boon to Mexican fishermen and to the new port of Alvarado.

The octopus, previously little in demand, is caught off Yucatan and Campeche, trucked to Alvarado, cut up, and quick-frozen for export. The port directors are worried about the capability of the existing fleet to satisfy the new demand. They claim a bigger fleet is needed. More demand is anticipated from sample shipments sent to Europe. ("Mexico City News," Aug. 2.)

* * *

BUILDS 15 SHRIMP TRAWLERS
FOR ALVARADO

A Veracruz shipyard is building 15 new shrimp trawlers for the pilot fisheries complex at Alvarado at a total cost of US$2 million. The first will be launched in November, followed by another each 20 days. They will be incorporated immediately into the 6,528-vessel Mexican fishing fleet.

The port of Alvarado lacks fishing vessels. These new trawlers should help materially in utilizing fully the port's facilities. ("El Sol," Aug. 6.)

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SHRIMP FLEET IS AGING

Mexico's shrimp fishing fleet is old, say sources close to the fishing industry. All but 400 of the 2,000 vessels are 50 years old and less than 19 meters (62 feet) long. Fewer than 200 are fully adequate. The aged vessels contribute to industry's inefficiency. Two-thirds as many new vessels could take the shrimp now taken by all old vessels. Mexican shipyards could easily produce the vessels needed to modernize the industry.

A plan is being considered to replace all old vessels with new ones in 10 years, including vessels for other species such as tuna. The method of financing this project has not been decided.

Shrimp is Mexico's fifth largest export, representing an annual income of US$17.2 million. ("Mexico City News," Aug. 1.)

## Cuba

ACHIEVES PLANNED 1967
CATCH IN MID-JULY

The planned 1967 catch of the Cuban fishing fleet (15,235 metric tons) was achieved in

Cuba (Contd.):

mid-July; 15,268 tons of fish had been caught and processed. High-quality food fish made up 81 percent of catch. Fleet operated both in the Atlantic (Gulf of Mexico, Caribbean, Mid-Atlantic, Newfoundland grounds, South Atlantic off Argentina, and Brazil) and the Pacific.

This fleet, "Flota Cubana," is only part of the total fleet of fishing vessels. It is distinguished from the others in that it operates on the high seas. In 1965, it landed only about 4,400 metric tons of fish. The early achievement of the 1967 goal was made possible by the purchase from Spain in 1966 of tuna long-liners and bottomfish trawlers.

* * *

FISHES FOR TUNA IN EASTERN PACIFIC

The long-liner "Bonito," manned by Cubans, left Havana January 25, 1967, to fish tuna in the eastern Pacific. The vessel returned to Havana in early April with 155 metric tons of tuna and billfish taken in 41 days of fishing time; the rate was 3.8 tons per actual fishing day. Principal species caught were yellowfin tuna, big-eyed tuna, and American sailfish. The area fished extended from Baja California to Ecuador.

Two scientists of the Cuban Fisheries Center accompanied the vessel. Scientific studies included stomach analyses, catch sampling, water temperature, etc.

The Bonito

The "Bonito" is a 655-gross-ton long-liner built in Spain. It has a crew of 38. In 1966, 19 such vessels were delivered to Cuba. The vessels are 55.25 meters (181 feet) long, 9 meters (29.5 feet) wide, and 4.25 meters (14 feet) deep. Each has a 1,300-hp. diesel engine with a speed of 11.25 knots; an air-blast freezer of 22-tons-per-day capacity, with a refrigerated hold capacity of 580 cubic meters.

The vessels were constructed in five shipyards in northern Spain. Ten are 655 tons, 7 are 569 tons, and 2 are 642 tons. The Cubans also have five 387-ton Japanese long-liners purchased in 1962, with a freezing capacity of 220 tons each.

The rate of catch of 3.8 tons a day compares favorably with Japanese catch rates. The fleet apparently is ready to begin fishing on a large scale, possibly in the eastern Pacific.

Cuba is not a member of the Inter-American Tropical Tuna Commission, and so is not bound by its yellowfin tuna quota and recommended regulations. ("Mar y Pesca," May 1967.)

## Chile

ANCHOVY CATCH, MEAL AND OIL OUTPUT DROP

Chile's total fish meal production during January-July was 99,452 tons.

In the area between Mejillones and Talcahuano, fish meal production for January-July 1967 was 20,465 tons, compared to 18,401 tons for the 1966 period.

Northern Chile's Anchovy Catch, Fish Meal and Oil Production, January-July 1967

| | 1967 | 1966 | 1965 |
|---|---|---|---|
| | (Metric Tons) | | |
| Anchovy Catch: | | | |
| July | 68,197 | 92,918 | 12,115 |
| Jan.-July | 432,752 | 850,397 | 281,259 |
| Meal Production: | | | |
| January | 15,983 | 33,504 | 12,836 |
| February | 20,294 | 27,113 | 11,371 |
| March | 7,794 | 13,536 | 10,278 |
| April | 1,651 | 14,067 | 3,587 |
| May | 3,447 | 26,754 | 4,090 |
| June | 16,487 | 18,783 | 2,989 |
| July | 13,331 | 17,865 | 2,188 |
| Jan.-July | 78,987 | 151,622 | 47,339 |
| Oil Production: | | | |
| July | 770 | 1,693 | 1/ |
| Jan.-July | 6,468 | 16,246 | 5,838 |

1/Not available.

For first-half 1967, production of fish meal from fish other than anchovy amounted to 17,306 tons--compared to 16,398 tons in first-half 1966 and 13,737 tons in the 1965 period.

* * *

EXPORTS OF FROZEN SHRIMP AND LANGOSTINOS INCREASE

The export of Chilean shrimp and langostinos continues to increase. In 1966, exports were 2,612.4 metric tons--3.7 times the 1961 figure. Top 1966 customers were the United Kingdom, the U. S., Sweden, and West Germany.

Chile (Contd.):

In 1966, for the first time, the U. S. was not the leading buyer.

Exports of Frozen Shrimp and Langostinos

| | 1966 | 1965 | 1964 | 1/1963 | 1962 | 1961 |
|---|---|---|---|---|---|---|
| | (Metric Tons) | | | | | |
| Argentina | 1 | 18 | 32 | 2 | 5 | 1 |
| Belgium | 42 | 15 | 14 | 4 | - | 5 |
| Canada | - | 5 | 16 | 10 | 3 | 2 |
| Denmark | 68 | 25 | 45 | 58 | 13 | - |
| France | - | 10 | 7 | 4 | 3 | 1 |
| Italy | - | - | - | 4 | - | - |
| Netherlands | 84 | 120 | 66 | 28 | 13 | - |
| Norway | - | - | - | 1 | - | - |
| Peru | - | - | 6 | - | - | - |
| Spain | 4 | - | - | - | - | - |
| Sweden | 246 | 106 | 40 | 36 | - | 4 |
| Switzerland | 5 | - | - | 3 | 3 | - |
| United Kingdom | 1,136 | 538 | 483 | 329 | 301 | 128 |
| United States | 821 | 963 | 807 | 700 | 548 | 538 |
| W. Germany | 206 | 158 | 162 | 125 | 26 | 30 |
| Total | 2,613 | 1,958 | 1,678 | 1/1,304 | 915 | 709 |

1/Includes an estimated 260 tons of canned shrimp and langostinos.
Source: Instituto de Formento Pesquero, Seccion Economia.

The 1966 Chilean declared export value per metric ton was US$1,777 (80¢ a lb.) for shrimp and US$1,567 (71¢ a lb.) for longostinos.

## Brazil

U. S. COMPANIES PLAN SHRIMP BASES

W. R. Grace is setting up a shrimp fishing and processing base in Belem, northern Brazil, through its Brazilian subsidiary PRIMAR. The operation is scheduled to begin in October. Eventually, it will have 20 modern trawlers.

It has been reported that the Borden Company in the U. S. intends to make a move in this direction--probably late this year or early 1968. (U. S. Consulate, Belem, Aug. 3.)

## Ecuador

FISHING INDUSTRY CONTINUES TO DEVELOP

The Ecuadorean fishing industry continued to develop in the second quarter of 1967 as it attracted foreign investment. Tuna fishing was good. Frozen tuna exports from Manta were 8,000,000 sucres (US$440,000) in January-May; there had been none in the 1965 period. Manta's canned tuna exports rose from 4,250,000 sucres (US$233,516) in the first five months of 1966 to 6,720,000 sucres (US$369,231) in January-May 1967. INEPACA's Manta fish meal plant reopened, and the fishing center's tuna packers imposed quotas as the local fleet brought in a record catch.

Industry Developments

New fish-related companies are located at Guayaquil or the Santa Elena Peninsula. At Guayaquil, Far Camp opened a plant to process tuna and sardines. It plans to can fruit juice at a later date. Pesquera Industrial del Pacifica (CAPINPAC) was organized to build a 1,000,000-sucre (US$55,000) plant to freeze and can fish and shellfish, and to extract fish oil and refine fish meal, for export and domestic use. Americana de Conservas S. A., capitalized at 1,000,000 sucres by German, Portuguese, and local interests, will can "pinchagua" (sardines) in tomato paste and oil. Sirio Cia. Ltda. will can tuna and make fish meal.

On the coast, the million-sucre Frigorificos Lemar S. A. plant at Santa Elena will freeze tuna and white fish, and extract fish oil. At nearby Santa Rosa, Pesquera Industrial Sol S. A. (PISSA) will can and freeze fish and shellfish.

Government and International Aid

Government efforts to promote even more development in the fishing industry included establishment of a Fisheries Institute at the Technical University of Manabi, and approval of a Decree Law authorizing fishermen to import necessary equipment free of duty.

FAO and Pan American Union fisheries experts visited the coast during March-June. They discussed creation of a Fisheries Institute in Manta to teach practical skills. Also, a Mexican-Ecuadorean organization (DIECA) announced plans to produce alfalfa meal and mix it with molasses and fish meal to provide a quality livestock food. It is expected that at least part of the firm's production will be exported to Mexico. (U. S. Embassy, Quito, Aug. 18.)

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RAISES FISHING FEES AND EXPORT DUTIES

Ecuador has raised substantially the fees it charges foreign vessels to fish in her 200-

Ecuador (Contd.):

mile territorial sea. A law passed June 8, and published in the "Official Register" July 17, amends the Maritime Hunting and Fishing Law. It provides: annual registration (Matricula) fee, valid until Dec. 31 of each year, of US$350 for vessels fishing tuna and swordfish and $200 for vessels fishing other species. It provides also for a license fee per net vessel registered ton per voyage of $35 for tuna and swordfish, and $18 for other species.

Previous matricula fees for tuna and swordfish were $200, plus a license fee per net vessel registered ton per voyage of $20 for swordfish and $12 for tuna. Fees will be paid to Ecuadorean consulates abroad or to the General Directorate of Fisheries in Quito. They must be in U. S. dollars or their equivalent in freely exchangeable currencies.

New Export Duties

The new law provides also for new export duties in sucres per net kilo (U. S. cents per lb.): tuna (filleted) and swordfish, 0.04 (0.09¢ lb.); whole frozen tuna, 0.08 (0.18¢ lb.); codfish, 0.06 (0.14¢ lb.); filleted codfish, 0.03 (0.07¢ lb.); liver, oil, fins, or skins of sharks, 0.05 (0.11¢ lb.); frozen shrimp or crayfish, 0.03 (0.07¢ lb.); and others 0.02 (0.05¢ lb.).

Note: 20.33 sucres equal US$1.

## Colombia

JAPANESE FIRM TO EXPLORE FOR SHRIMP OFF COLOMBIA

Colombia has licensed the Japanese fishing firm Nichiro to conduct exploratory shrimp fishing off her coast. The firm's trawler "Nisshin Maru No. 50" (260 gross tons) was scheduled to depart Japan on July 18 to operate out of the fishing base at Buenaventura.

Nichiro also plans to conduct mothership-type shrimp fishing near the mouth of the Amazon River this fall. It has selected the "Kuroshio Maru No. 22" (499 gross tons) to serve as mothership for 5 trawlers. (Suisancho Nippo," July 11.)

## El Salvador

ISSUES LICENSES AND OPENS DATA CENTER

A June 6 decree provides for issuance of 18 licenses (including 8 previously granted) for catching fish to be processed into fish meal. The licenses are valid for 5 years. Purse seines, long lines, and gill nets are authorized gear, but trawls are prohibited. The licenses apparently are not limited to individual vessels because the first license was issued to a group with 4 vessels. Of 10 new licenses available, 7 are reserved for vessels attached to the shrimp fleet and used to collect incidental fish taken by shrimp vessels; the 7 also may fish for industrial fish.

The number of licenses will be restricted until more is known about the effects of the industrial fishery on coastal resources. Shortly after the decree was issued, a license was granted to one firm to purse seine with two 65-foot vessels (each has capacity of 50 metric tons) and five 35-foot auxiliary boats.

Inspection Office and Data Center Opens

A fishery inspection office and data center was opened in El Trifuno. In addition to inspection, it will collect statistical data on the shrimp fishery. It is also the operational base for the Central American Regional Fisheries Project.

Firm Promotes Fish Consumption

Atarraya, S. A., a large shrimp fishing firm, has intensified efforts to promote local consumption of seafood. The company has divided San Salvador into 6 zones. Each zone is visited weekly by a small truck carrying fresh fish. The truck does not stop in the wealthy sections, where fresh fish is available in good markets. (U. S. Embassy, San Salvador, Aug. 17.)

## Honduras

LEADING SHRIMP PLANT OPERATION CUT

The leading shrimp-packing plant in Honduras' north coast was operating at half capacity in early August. This was due to the absence of many U. S. vessels, which normally trawl and land their catch there. They had moved on to fish off Texas because shrimp were more abundant there. (U. S. Embassy, Tegucigalpa, Aug. 9.)

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# EUROPE

## USSR

### RESEARCH VESSELS STUDY SOUTH AMERICAN FISHERY RESOURCES

Two research vessels, "SRTM-8453" and the "SRTM-8459," of the Pacific Research Institute for Fisheries and Oceanography (TINRO), have been studying fishery resources off Latin America's west coast since early 1967. The area includes large expanses of water off Ecuador, Peru, and Chile. In May, both vessels came into Puerto Mott (southern Chile) for water, fuel, and food.

Both vessels concentrated on fisheries and oceanographic research off southwestern Latin America (particularly the Humboldt Current area) and throughout the South Pacific. Researchers determined the biological characteristics of Pacific pike-mackerel spawning habits. On their way home, Soviet scientists visited the fisheries laboratory at Papette, capital of French Tahiti.

#### Meager Research in Southeastern Pacific

Southeastern Pacific fishery oceanography research has been meager and Soviet scientists are pioneering in the area. TINRO has sent research vessels there several times in the last few years. They discovered significant fishery stocks and interesting oceanographic data. The Soviets claim, for example, that cold Humboldt Current not only swings westward but also sinks as it goes north. Plankton penetrates to great depths and serves as food for the Peruvian anchovy which, in turn, is forage for giant squid found in enormous concentrations in the Humboldt Current (especially south of Galapagos Islands) by previous Soviet expeditions. Squid weighed from 10-40 kilograms (22-48 lbs.) each.

The scientists found abundant stocks of South Pacific saury or mackerel-pike (Scomberesox forsteri) from Southern Peru to Southern Chile. This species is related to North Pacific saury and is also responsive to light--but, unlike its northern relative, only from January to April (the northern saury from July through November). This peculiarity might make it possible for the Soviet Far Eastern fishermen to develop a year-round fishery for Pacific sauries.

Other fish stocks found by TINRO scientists in southeastern Pacific include tuna, yellowtail (found near Sebastian Vizcaino Bay off Baja California, Mexico), and whales.

#### TINRO'S Large 1966 Operation

In 1966, TINRO organized a research fleet of 15-20 vessels to study fisheries and ocean conditions of the eastern and southern Pacific. These vessels were sighted passing the U. S. coast. There is considerable information on their activities off Mexico, Australia, New Zealand, and in the Indian Ocean--but none on the research off the west coast of Latin America.

* * *

### WILL EXPAND FISHING OFF NORTHERN CANADA AND GREENLAND

Exploratory research by the Murmansk Fisheries Administration in first-half 1967 around the southern tip of Greenland, in the Labrador Sea, and in the Davis Strait indicates the Soviet Northern Fleet can expand its fisheries. The area's fish stocks include many species presently in great demand by Soviet consumers but not fished intensively.

One reason for switching part of the fleet northward is that Soviet fleets experienced poor fishing off Nova Scotia this past summer.

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### PATROLS SALMON FISHERY IN NORTHWEST PACIFIC

Three Soviet medium side trawlers were assigned fishery patrol duty in the area where, under the USSR-Japan Pacific Northwest Fisheries Agreement, salmon fishing by Japanese firms is allowed. The 3 trawlers (the "Diana," "Neva," and "Nelma,") belong to the Sakhalin RYBVOD, a fisheries protection and enforcement organization administered by the Ministry of Fisheries.

The surveillance of Japanese fishing began in early July and continued until mid-August.

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USSR (Contd.):

## ACTS TO PROTECT KURIL ISLAND SEALS

The Fishery Management Section (RYBVOD) of the Sakhalin Fisheries Administration recently acted effectively to control fully all seal and sea otter hunting in the Kuril Island Chain. Preliminary estimates show that the islands are rich in fur seals (15,000-20,000 heads), sea lions (about 20,000), sea otters (about 4,000), and ringed seals.

In spring 1967, the Sakhalin RYBVOD prohibited any seal or otter hunting. Two inspection teams were organized in May 1967 to enforce the regulations; one worked from Urup Island, the other from Paramushir Island. At the same time, RYBVOD fisheries management vessel "Diana" left her home port of Korsakov to conduct a census of Kuril Island sea otters.

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## STUDIES ARTIFICIAL REPRODUCTION OF PACIFIC SCALLOPS

In late June, scientists of the Pacific Institute for Fisheries and Oceanography (TINRO) began studying the possibility of raising scallops by artificial propagation in a natural marine environment. Their study area is Aniva Bay, south of the City of Korsakov on Sakhalin Island.

The scientists are using an underwater research vehicle. Aqualung divers catch the female specimens on the ocean bottom and transport them to a preselected lagoon. There, special underwater containers have been installed to aid in the undisturbed development of young scallops.

### Scallop Fishery Not Successful

Soviet Far Eastern fishermen began catching scallops in 1966. They had little success. Instead of the planned 3,000 metric tons, only 1,000 tons were landed by year end. Most were exported to Japan.

In 1964, the USSR attempted to establish a scallop export market in the U. S. It did not succeed because the Pacific scallops were coarse and had dark meats.

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## ORDERS FISHERY VESSELS FROM THE NETHERLANDS

The Royal Shipyards "De Schelde" at Flushing, the Netherlands, has received an order from the Soviet import firm "Sudoimport" for 4 fully automated fish-processing refrigerated transports. The 2,600-gross-ton vessels each will have a crew of over 100, an endurance of 60 days, and be able to process 50 metric tons of fresh fish each day.

Six similar vessels were ordered from the Dutch shipyard in July 1964 for delivery in 1965-67 and were assigned to the Soviet Atlantic fishing fleets. (U. S. Embassy, Hague.)

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## EXHIBITS FISHERY PRODUCTS IN MONTREAL

Soviet fishery products and activities are prominently displayed at EXPO-67 in Montreal. A large and highly visible section of the Soviet Pavilion features a tank with large, live sturgeon and a fisheries bathyscaphe.

A Soviet-made hydrofoil (capacity 100 passengers) takes visitors to a large Soviet stern factory trawler anchored in Montreal's commercial harbor.

### Fishery Products Are Promoted

Soviet fishery exports are promoted. Attractive advertising pamphlets praise the quality of various Soviet fishery products. These include traditional caviar and sturgeon ("Royal Sturgeon" trade mark) and products the Soviets have just begun to manufacture: canned saury in oil, canned shrimp in natural oil, canned mussels in natural juice, and canned tuna in oil.

The phamphlets carry the name of PRODINTORG, the official export trade firm. Attractively designed, they are printed on excellent paper.

## Denmark

FISHERMEN ARE RETURNING TO
NORTH NORWAY FOR SALMON FISHING

Fishermen from the Danish port of Esbjerg made excellent salmon catches last year along the North Norwegian coast, but they were not permitted to land catches in Norway for transshipment to Denmark. The cutters had to sail home with their catches, losing much fishing time and greatly increasing expenses.

Several Esbjerg fishermen plan to return to salmon fishing off Norway. This year, however, they intend to be accompanied by a mothership that will transport the catch. Negotiations have begun with the owner of a large steel cutter that could be converted for this purpose. Salmon fishing in the area begins in September. ("Fiskaren," Aug. 16; U. S. Embassy, Copenhagen, Aug. 25.)

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LARGEST DANISH STEEL
SIDE-TRAWLER BEING BUILT

A Danish shipyard is building a steel trawler using new production principles that involve mathematical methods to reduce building time and to increase production economics. The trawler will be the largest steel vessel ever built in Denmark for Danish owners. It will be used for midwater and bottom trawling.

The vessel's main dimensions are: overall length, 35 meters (115 feet); width, 7.30 meters (24 feet); and height, 3.65 meters (12 feet). A diesel engine of 990 hp. will be installed.

Midwater and Bottom Trawls

The fishing gear has been developed by Danish netmakers. It consists of one 30- to 40-fathom midwater nylon trawl, and 3 "tailed" bottom terylene trawls. This gear is expected to increase the profitability of midwater and bottom trawling. It is used on the Greenland fishing grounds. It is considered especially well suited for combined midwater and bottom trawling when the vessel is sufficiently powerful--about 1,000 hp.

The vessel's design includes provision for later conversion to power block purse-seining and long-line fishing. ("Sofart," July 1967; U. S. Embassy, Copenhagen, Aug. 25.)

## Greenland

WEST GREENLAND
PELAGIC SALMON FISHERY GROWS

Three Danish and 4 Faroese gill-netters will fish salmon off Greenland this year. The Danish catches will be landed at Faeringhavn, Greenland. They are already committed. An excellent market is expected in Denmark for the Faroese-caught salmon.

The addition of these vessels to the fishery represents a large increase in effort from 1966. Then, one Norwegian and one Faroese vessel caught, respectively, 18 and 70 metric tons (eviscerated, heads on). The captain of the Faroese vessel said only bad weather kept his catch below 100 tons. (U. S. Embassy, Copenhagen, Aug. 25.)

## Norway

FISH MEAL AND OIL
PRODUCTION SETS RECORDS

During first-half 1967, Norway's production of fish meal and oil increased more than 50 percent over first half 1966--to records of 285,000 metric tons, and 115,000 metric tons, respectively. According to Norsildmel, the central sales organization of the fish reduction industry, all but 60,000 tons of the fish meal were shipped to customers at home and abroad; the entire production of fish oil was sold for summer and fall delivery.

Exports of fish meal totaled 222,062 tons in January-June--nearly twice the first-half 1966 figure. Fish oil exports increased from

Norway (Contd.):

22,800 tons in January-June 1966 to 36,000 tons during the 1967 period. Export prices are not published. According to official foreign trade statistics, however, the average export price for fish meal was reduced 15 percent--to 1,180 kroner (US$165) per metric ton--in January-May, compared with 1966 period; fish oil price dropped 24 percent to 1,065 kroner ($150) a metric ton.

Prospects for exports of fish meal and oil for the rest of the year are less favorable due to increased world supplies.

Fish Supplies Are High

In January-June 1967, supplies of fish (mainly herring, mackerel, and capelin) reached a record 13.4 million hectoliters (about 1.25 million metric tons). So far this year, 4 major fish-marketing organizations have imposed fishing stops a total of 33 times for certain periods and fishing areas--due to large discrepancies between catching and processing capacities. The lack of processing capacity has been especially pronounced in the middle and northern parts of Norway. Fish stops idled the fleets in those areas 12 times for a total of 2½ months during January-June. This curbed particularly capelin fishing activities in Finnmark.

According to an industry source, fish reduction capacity would have to be increased about 50 percent, at a cost of US$20-30 million, to equalize the capacity of the fleet fishing for reduction purposes (600 power-block purse-seiners account for about 90 percent of the catch). The industry is not thinking seriously of so large an expansion because of the capital needed, the capriciousness of shoal fish, and the current instability of the meal and oil markets.

A medium-sized reduction plant (daily capacity 2,000 tons of fish) was recently put into operation in Baatsfjord, Finnmark. Other increases in capacity, planned or underway, are relatively insignificant. (U. S. Embassy, Oslo, Aug. 11.)

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FISHERMEN PROTEST IMPORTS OF SOVIET SALTED FISH

Norwegian fishermen complain that when they return from long trips (4-5 monghs) to West Greenland they have to go to Danish ports to obtain acceptable prices for their fish--while the Soviets land salted fish in the Norwegian port of Aalesund.

Soviet salted fish has been imported by Norway for over one year. The factory stern trawler "Pluton," from Murmansk, brought the last shipment. The vessel was delivered from Gdansk, Poland, on June 14, 1967. Then it sailed to Murmansk, where the rest of the crew came aboard, the outfitting was completed, and the cargo loaded.

Pluton departed recently for the South American coast. It is equipped with purse seines and fish pumps. It will serve as an experimental base for Soviet attempts to introduce a link between large processing ships and stern trawlers. ("Fiskaren" and other sources, July 12.)

## Sweden

FIRM MAY TEST-MARKET FPC IN MEXICO

A Swedish firm intends to test-market fish protein concentrate (FPC) in Mexico beginning this fall, according to a Swedish newspaper report. A hospital in Mexico City reportedly will cooperate in the test. The price proposed by the Swedish firm for its FPC is about 32 cents a pound. (U. S. Embassy, Stockholm.)

* * *

LIFTS TARIFFS ON CERTAIN IMPORTS

Sweden announced the removal of all tariffs on certain fats and oils, effective September 1, 1967. These include crude sperm oil; crude seal oil; fish oils and oils derived from the blubber of marine animals for medicinal and veterinary uses; cod-liver oils and industrial liver oils.

In 1966, the U. S. exported over 6.6 million pounds of fish and fish-liver oils to Sweden, a tremendous decline from the 45 million pounds in 1965 and 73.5 million in 1963.

Sweden (Contd.):

Total U. S. exports of fish and fish-liver oils also declined over the same period--from 262 million pounds in 1963 to only 77 million pounds in 1966. (U. S. Embassy, Stockholm, Sept. 8.)

## West Germany

COMBINATION TRAWLER-SEINER IS BEING BUILT

A shipyard in Bremerhaven, West Germany, is building a combination trawler-purse seiner, the "Seefahrt," for a shipowner. The vessel is 64 meters (210 feet) long; 10.8 meters (35 feet) wide; and height to top deck is 7.48 meters (24.5 feet).

Two diesel engines have been installed. Each supplies 1,320 hp. at 500 r.p.m., gear coupled to a single propeller, which gives a speed of 15.5 knots at 200 r.p.m.

The purse seine is carried on a platform aft near a mast equipped with derrick and power block. Two fish pumps are used to haul the catch aboard. To increase maneuverability, 250 hp. steering propellers are installed fore and aft. The vessel is equipped with sonar and two echo-sounders. ("Fiskets Gang," July 20; U. S. Embassy, Copenhagen, Aug. 25.)

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CUTS BACK CONSTRUCTION OF FACTORY TRAWLERS

West Germany deemphasized the building of factory trawlers in 1966 when only 2 of the 5 trawlers built were freezer trawlers. The other 3 were built to land fresh fish.

West Germany caught fewer fish in distant waters in 1966 than in 1965; its catch off Greenland was down 25 percent. This decline was offset only partly by an increase in the catch off Canada. Some trawlers were diverted from the distant-water fishery to nearby waters to midwater trawling for herring. (U. S. Consul, Bremen, May 29.)

## Ireland

GETS US$14 MILLION FRENCH CREDIT TO EXPAND FISHING FLEET

The Irish Sea Fishing Board has obtained credit of US$14 million from French financiers associated with shipbuilders to expand Ireland's fishing industry. The funds will be used to add 100 new trawlers (mostly 90-foot and under) to the fleet over the next 5 years, and to provide educational and technical assistance to the industry.

Prospective vessel owners will pay a minimum of 5 percent down, supplemented by a 25-percent grant from the Board. They will pay the remaining 70 percent in installments over 5 years at 5.2 percent interest, or 9 years at 6.3 percent. For vessels under 90 feet, interest will be 4 percent. Loans will be guaranteed by the Board, a semigovernment body.

Foreign Credit Was Necessary

The Board sought foreign credit after plans for fisheries improvement failed to raise needed funds within Ireland. Board members talked with Norwegian, British, Polish, and French financiers. The French group was chosen because it offered better terms and it was associated with shipbuilders that quoted lowest trawler construction prices. With the additional vessels, the Irish fleet should number around 400.

Overall landings have been increasing 15-20 percent a year. Annual landings of 35,000 tons have been worth US$5.9 million, The two-year-old fishermen's training program has proved itself. In recent years, exports have increased 13 percent per annum. Expansion plans have been stymied until now, however, because new vessels were lacking. The Irish plan to enter the Common Market and are promoting fishing as a major industry. (U. S. Embassy, Dublin, Aug. 3.)

## Italy

LIBERALIZES FISHERY IMPORTS FROM USSR AND EAST EUROPE

The Italian Government has included fresh and frozen fishery products among products

Italy (Contd.):

that may be imported free of duty from the Soviet Union and East European countries. The latter are Poland, Hungary, Bulgaria, Czechoslovakia, and Albania.

The Italian Federation of Fishery Enterprises led the opposition to this step in the Italian Parliament. It pointed out that other Common Market countries have not fully liberalized duties on imports of fishery products. ("La Peche Maritime," July.)

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FIRM OPENS TOKYO
TUNA BUYING OFFICE

An Italian tuna-importing firm jointly established by 4 packers in Sicily and Venice has opened a purchasing office in Tokyo. The firm's president went to Tokyo recently to arrange tuna purchases from Japanese firms.

The Italian firm plans to purchase annually 10,000 metric tons of tuna (around 75 percent yellowfin and 25 percent big-eyed). It also plans to buy tuna from South Korea and Formosa. ("Suisancho Nippo," July 22.)

## United Kingdom

FURTHER RESTRICTS
FOREIGN COD LANDINGS

The ban on foreign cod landings, instituted July 27 by the British Trawlers' Federation (BTF), spread August 7 from Grimsby to other ports in England and Wales. The BTF now provides facilities to unload cod only in amounts equal to one-half the weight of other species aboard a foreign vessel.

The action was taken to stem increased imports and reduce prices. Its proponents said that Britain, unlike most other countries, did not restrict landings by foreign vessels, and that low tariffs did not deter foreign landings. They said also that "disturbances" in market conditions in other countries meant that cheap fish always ended up in England. The BTF action was taken in the absence of government action. The restrictions do not apply to Faroese vessels because of a previous industry-level agreement. ("Fishing News," Aug. 11.)

## France

REQUIRES DATE MARKING
OF FROZEN FOODS

A French Government Order published earlier this year requires date marking of all frozen foods in institutional or retail packs. The regulation does not cover frozen foods in bulk packs that are to be broken down for sale as unfrozen products through retail outlets.

Date marking may be either in clear figures or in code, provided the code is given to the French Service for the Repression of Frauds. (U. S. Embassy.)

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IMPORTS MORE FISHERY PRODUCTS

Total French imports of fish and crustaceans from all countries in first-half 1967, were valued at over $45 million. First-half 1966 imports were worth $38 million.

Imports of U. S.-produced fish and crustaceans were US$1.5 million (3.4 percent of total) in first-half 1967; in the 1966 period, US$1.1 million (2.8 percent of total).

Frozen salmon is the primary U. S. export to France. (U. S. Embassy, Paris, September 15.)

# ASIA

## Japan

### RATIFIES ATLANTIC TUNA CONVENTION

The International Convention for the Conservation of Atlantic Tunas was ratified by the Japanese Government on July 25. The ratification document was deposited with the UN's Food and Agriculture Organization (FAO). Japan is the second nation to ratify the Convention, following the U. S. The Convention will enter into force after 7 ratifications. ("Katsuo-maguro Tsushin," Aug. 4.)

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### CUTS TARIFFS ON FISHERY PRODUCTS

Among the tariff cuts Japan made during recently completed negotiations for imports are those on fresh and frozen tuna and salmon. Naturally, the cuts will increase imports.

Tariff Reductions on Major Fishery Items

| Product | Former Tariff Rate | New Tariff Rate |
|---|---|---|
| | (Percent) | |
| Whale oil | Free | Free |
| Salmon (fresh & frozen) | 10 | 5 |
| Tuna (fresh & frozen) | 10 | 5 |
| Salmon roe | 15 | 7.5 |
| Shellfish | Free | Free |
| Canned fish and preparations | 20 | 15 |
| Crustacea and mollusc preparations | 20 | 15 |

There is speculation about the effect the cuts will have on salmon imports from the USSR and Alaska. Attracting most attention, however, because of the import trend in marine products, is the tariff cut on "saki-ika," dried and stripped squid. (Fishery Attaché, U. S. Embassy, Tokyo, Aug. 9.)

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### EXPORTS OF FRESH AND FROZEN PRODUCTS DROPPED

Finance Ministry data show that Japanese exports of fresh and frozen tuna during January-June 1967 totaled 48,939 metric tons, almost 50 percent less than the 1966 period total of 90,619 tons. Oyster exports gained sharply over 1966. ("Suisan Tsushin," Aug. 19.)

| Product | Quantity | | Value | |
|---|---|---|---|---|
| | 1967 | 1966 | 1967 | 1966 |
| | (Metric Tons) | | (US$1,000) | |
| Tuna | 48,939 | 90,619 | 21,349 | 41,453 |
| Swordfish | 2,700 | 3,530 | 2,067 | 3,096 |
| Sea bream | 4,794 | 11,718 | 723 | 1,686 |
| Saury | 4,988 | 4,154 | 1,899 | 910 |
| Rainbow trouts | 1,484 | 1,073 | 1,492 | 870 |
| Oysters | 737 | 77 | 406 | 79 |
| Whale meat | 5,241 | 3,571 | 1,613 | 1,682 |
| Others | 25,865 | 28,166 | 9,464 | 10,351 |
| Total | 94,748 | 142,908 | 39,013 | 60,127 |

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### FISH LANDINGS AT YAIZU DECLINE SHARPLY

Landings at the fishing port of Yaizu in July totaled 10,979 metric tons worth about 1.6 billion yen (US$4.33 million), according to the Yaizu Fishery Cooperative Association. Due to the poor albacore tuna catch, landings were sharply below the 19,188 tons of June 1967. ("Kanzume Nippo," Aug. 4.)

| Species | Quantity | | | Average Prices | | |
|---|---|---|---|---|---|---|
| | 1967 | | 1966 | 1967 | | 1966 |
| | July | June | July | July | June | July |
| | (Metric Tons) | | | (US$/Short Ton) | | |
| Tuna: | | | | | | |
| Bluefin1/ | 3,454 | 4,943 | 4,900 | 573 | 450 | 397 |
| Albacore | 697 | 8,882 | 1,497 | 455 | 397 | 443 |
| Skipjack | 6,154 | 3,531 | 8,561 | 237 | 231 | 169 |
| Mackerel | 143 | 1,201 | 329 | 129 | 74 | 72 |
| Others | 531 | 631 | 616 | | | |
| Total | 10,979 | 19,188 | 15,903 | | | |

1/Includes yellowfin and big-eyed tuna.

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### EXPORT TUNA PRICES RISE

The price of Japanese albacore tuna for direct export to the U. S. rose to c.i.f. US$530 a short ton, according to a mid-July 1967 report. The price strengthened in late July. In Japan, domestic processors were paying ex-vessel 190-195 yen a kilogram ($479-492 a short ton). The highest export price attained in recent years for direct shipments to the U. S. was $575 a short ton c.i.f. in February 1966. A decline in exports depressed prices to a low of $420 a ton c.i.f. in March 1967.

Japanese Tuna Export Price Trends, January-July 1967

| Month | Direct Exports to United States & Canada1/ | | American Samoa2/ | |
|---|---|---|---|---|
| | Albacore | Yellowfin | Albacore | Yellowfin |
| | (f.o.b. US$/Short Ton) | | | |
| January | 495 | 439 | 390 | 350 |
| February | 479 | 409 | 370 | 330 |
| March | 446 | 401 | 355 | 315 |
| April | 404 | 336 | 345 | 305 |
| May | 404 | 339 | 340 | 295 |
| June | 424 | 351 | 350 | 295 |
| July | - | - | 370 | 300 |

1/Prices represent averages for the month.
2/Prices are for ship-frozen tuna.

Japan (Contd.):

Japanese yellowfin prices for direct shipment to the U. S. west coast continued at around $400 per short ton c.i.f., but a sale of about 1,900 tons to a Puerto Rican packer was made at $440 a short ton c.i.f. ("Suisan Tsushin" and "Suisan Keizai Shimbun," July 20.)

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## ALBACORE EXPORTS ARE SLOW BUT FISHING GOOD

Japanese albacore tuna exports to the U. S., which began declining in late July, continued sluggish in mid-August. U. S. packers showed very little buying interest. However, Japanese exporters expected sales to improve from around mid-September when the U. S. albacore season begins closing.

In negotiating prices with Japan, U. S. buyers are expected to be very cautious to avoid boosting prices, as occurred last year. The Japanese suppliers also realize that holding out for excessively high prices could create an adverse reaction. So the albacore export market is considered likely to continue strong without any sharp price upswing.

### Fishing Good

Albacore fishing in the Indian Ocean was good in Madagascar waters. The catches will begin arriving in Japan in September and will build up in cold storage.

The albacore fishery in the Atlantic Ocean also continued good. Landings were accumulating in cold storage. However, in view of continued good sales of canned white-meat tuna in the U. S., and its underproduction in Japan, supply and demand of albacore is expected to be kept in balance. ("Suisan Tsushin," Aug. 22.)

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## SUMMER ALBACORE FISHING ENDS

The 1967 summer pole-and-line albacore fishery off the Japanese islands has ended. The season's total landings at the fishing ports of Yaizu and Shimizu reached 28,500 metric tons in early July. Fish size averaged 13-14 kilograms (28.6-30.8 pounds): about 3,000 tons of the catch were under 10 kilograms (22 pounds).

The total quantity of summer albacore landings purchased by the Japan National Federation of Tuna Fishermen's Cooperative Associations (NIKKATSUREN), under its tuna price stabilization program, came to 181 tons. The tuna will be canned in oil for domestic sale. ("Suisancho Nippo," July 10.)

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## ALBACORE FISHING GOOD IN INDIAN OCEAN

Japanese albacore tuna boats in the Indian Ocean make excellent catches in June and July. This was particularly true off South Africa between latitudes 20° and 30° S. to southern Madagascar Island.

About 60 Japanese vessels were concentrated in those waters, an unusually high number for an Indian Ocean area.

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## CANNED TUNA IN OIL EXPORT VALIDATIONS, APRIL-JULY 1967

Japanese canned tuna in oil validated for export during April 1-July 31, 1967, totaled 871,159 cases, according to the Export Canned Tuna Packers Association. West Germany

| | Quantity Exported, April-July 1967 |
|---|---|
| | No. Cases |
| West Germany | 228,355 |
| Canada | 146,737 |
| Aden | 95,996 |
| Great Britain | 80,481 |
| Netherlands | 53,382 |
| Lebanon | 36,807 |
| Okinawa | 35,997 |
| Belgium | 31,131 |
| Saudi Arabia | 23,210 |
| Switzerland | 22,656 |
| Romania | 17,400 |
| Libya | 15,500 |
| Malta | 14,010 |
| Others | 69,497 |
| Total | 871,159 |

was the leading purchaser, taking 228,355 cases of total exports during the 4-month period. ("Kanzume Nippo," Aug. 22.)

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## FROZEN TUNA EXPORTS DECLINE

Fresh and frozen tuna validated for export during April-July 1967 totaled 35,287 metric tons, down 42 percent from the 1966 period's

Japan (Contd.):

60,998 metric tons, according to the Japan Frozen Foods Exporters Association. Yellowfin tuna exports declined sharply because of the U. S. fleet's abundant catches in the eastern tropical Pacific.

Exports to Europe also declined. This was due primarily to the depressed canned tuna sales in Italy and to the blockade of the Suez Canal during the mid-East conflict. ("Suisan Tsushin," Aug. 22.)

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## TUNA PURSE SEINING CONTINUES OFF AFRICA

The Japanese Atlantic tuna purse-seine fleet, now in its third year of experimental operation off West Africa, still has difficulty operating profitably on a year-round basis. The mothership "Chichibu Maru No. 2" (1,697 gross tons) and 3 purse seiners, now off Annobon Island, Gulf of Guinea, find fishing good from July-February. They catch up to 100 metric tons a day. But from late February until the end of June, fishing becomes spotty and landings decline sharply. The fleet is now searching for new grounds to fish during the slow season--to operate steadily year-round.

### Target Is 12,000 Tons

The fleet's 1967 production target is 12,000 metric tons of tuna. This would make operations profitable. From January to mid-August 1967, catches totaled 6,000 tons (75 percent yellowfin and 25 percent skipjack). Fishing picked up thereafter and the fleet is believed likely to attain its goal by December. ("Suisan Tsushin," Aug. 19.)

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## REPORT ON ATLANTIC TUNA FISHERY

Forty-two Japanese tuna vessels were operating in the Atlantic Ocean in July, reported the Japan Export Frozen Tuna Producers Association. In April, there had been 43; in May, 44; and in June, 44. During the remainder of 1967, 38 vessels were expected to operate in August, 35 in September, 31 in October, 30 in November, and 33 in December--a combined carrying capacity of 23,600 metric tons.

The Association estimated that from July to December 15,180 metric tons of the total Japanese Atlantic landings, or close to 65 percent of the fleet's carrying capacity, would be exported. This is about half the 29,920 tons of Atlantic-caught tuna exported during the 1966 period.

### Exports to U. S. and Italy

Exports of Atlantic tuna during April-June 1967 were 8,153 metric tons; of these, 3,338 metric tons were transshipped to the U. S., 4,049 tons to Italy, and 766 tons to other European and African countries. Comparable 1966 exports were 14,775 metric tons. ("Suisancho Nippo," July 19.)

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## SKIPJACK TUNA FISHERY OFF PALAU ISLAND WILL BE DEVELOPED

To help depressed independent skipjack tuna fishery operators, the Japan Federation of Tuna Fishermen's Cooperative Associations (NIKKATSUREN), is exploring the possibility of developing a skipjack fishery based at Palau Island in the western Pacific Ocean. The surrounding waters can be developed into a productive fishing ground because skipjack tuna and bait sardines are abundant there. However, the lack of adequate fueling facilities prevents vessel operations on a commercial scale. Therefore, NIKKATSUREN is studying the feasibility of constructing a fuel tank on the island, or conducting at-sea refueling operations. ("Suisancho Nippo," July 24.)

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## MACHINE-PACKING OF TUNA IN BRINE IS UNDER STUDY

To improve production efficiency and offset the rising cost of labor, Japanese tuna packers are considering adoption of the machine-packing method to process canned tuna in brine for export. Some Japanese packers already are machine-packing tuna in oil to overcome the high cost of hand-packing.

The Standards Committee of the Tuna Packers Association is now studying the machine-packed product from the standpoint of quality and output. If all remaining problems can be resolved, packers may be able to begin machine-packing tuna in brine for export in the

Japan (Contd.):

next fiscal year (April 1968). ("Kanzume Nippo," Aug. 31.)

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## "TUNA STEAK" MARKET DEVELOPED

A Japanese cold-storage company, which introduced in June its new tuna product "Daien Steak" on a trial basis in the Tokyo-Nagoya districts, achieved great success. It planned to start selling it nationally in September.

The steak consists of loins of yellowfin or big-eyed tuna. It is processed aboard the firm's tuna vessels in the Pacific and Indian Oceans. The vessels were specially equipped to package and freeze it in airtight 10-kilogram (22-lb.) cartons. The 10-kilogram package retails at 5,000 yen, US$13.88--said to be 20-30 percent below tuna prices in the Japanese fresh fish markets.

### Claims Advantages

The company claims these advantages for its tuna steak: (1) freshness, since fish is dressed and packaged immediately after catch; (2) uniform size and quality; (3) convenience in serving either raw or cooked; and (4) savings in freezing cost and storage space aboard vessels, since fish heads, tails, and entrails are discarded at sea.

Two other firms are marketing marlin steaks in Japan through their own sales outlets, but the Daien product is reported the first packaged tuna steaks for sale nationally. ("Minato Shimbun," Aug. 25.)

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## REPORT ON N. PACIFIC MOTHERSHIP SALMON OPERATIONS

Near the end of June, the 11 Japanese salmon mothership fleets were operating in the area of 163°-170° E. longitudes and 51°-54° N. latitudes in the North Pacific. They were gradually moving northeast toward the Aleutian Islands as they pursued Asian red salmon. Total fleet catch on June 30 was about 29,845 metric tons, 70 percent of the target of 42,635 metric tons.

The percentages of the catch by species (1966 figures in parentheses) were: reds--50 percent (40.3 percent); chums--32 percent (47 percent); pinks--11 percent (8.4 percent; silver and kings--7 percent (4.3 percent).

The mothership fleets began operations on May 20 and encountered good fishing for about one month. From around June 20, catches began falling off. ("Suisan Keizai Shimbun," July 6, "Suisan Tsushin," June 30.)

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## NORTH PACIFIC WHALING SEASON ENDS

Japanese whaling in the North Pacific ended August 20. All 3 fleets attained their assigned catch targets (see table).

| Fleet | Species | Catch | Period of Operation |
|---|---|---|---|
| "Kyokuyo Maru No. 2" | Fin back | 629 whales | May 17-Aug. 20 (96 days) |
| | Sei | 2,517 whales 734 BWU | |
| "Tonan Maru" | Fin back | 215 whales | May 21-Aug. 19 (91 days) |
| | Sei | 957 whales 267 BWU | |
| | Sperm | 1,000 whales | |
| "Nisshin Maru" | Sperm | 2,000 whales | May 17-Aug. 15 (91 days) |
| Note: BWU equal blue-whale units. | | | |

This year, the southern boundary of the whaling area east of 170° E. longitude was extended southward by 5 degrees, from 45° N. to 40° N. latitude. Hauls by "Kyokuyo Maru No. 2" attained a record 3,146 whales. ("Shin Suisan Shimbun," Sept. 4.)

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## PURCHASES OF MEXICAN SHRIMP INCREASED

Two major shrimp importers, Marubeni Iida and Mitsubishi Shoji, contracted in early August to purchase about 500 metric tons of Gulf of Mexico shrimp--despite heavy losses suffered by Japanese trading firms in mid-July when shrimp import prices declined sharply. The importers based their action on the belief that shrimp prices would not decline any further. ("Suisan Keizai Shimbun," Aug. 8.)

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## FROZEN SHRIMP IMPORTS ROSE

Japanese imports of frozen shrimp during January-June 1967 totaled 22,739 metric tons worth US$35 million, up 17.4 percent in quantity

Japan (Contd.):

and 20.1 percent in value over the 1966 period. Then, imports were 19,367 tons worth $29.2 million. The imports for first-half 1967 correspond to 63 percent of total 1966 purchases of 36,156 tons.

Shipments from the Soviet Union this year already have exceeded the total 1966 quantity, while imports from Communist China are running less than 50 percent of 1966 receipts. Shrimp purchases from Mexico and Thailand also are ahead of the 1966 period. ("Suisan Keizai Shimbun," July 24.)

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## GOOD SHRIMP FISHING OFF ALASKA

The Japanese "Chichibu-Maru" fleet (mothership and 10 catcher boats) discovered, in early June, concentrations of North Pacific red shrimp off Alaska and caught about 1,500 metric tons. This new area is southeast of Unalaska Island in the Aleutian chain. The fleet is engaged in year-round operations in the Bering Sea.

For the past 2 or 3 years, the shrimp fishery in the eastern Bering Sea has been declining--so the shrimp were named "phantom shrimp." The sudden appearance of dense schools of red shrimp is a surprise.

### Plankton Abundant

Although the North Pacific red shrimp are found over a wide range, concentrations are so rare that a fishery was considered very difficult. The recent discovery of shrimp concentration is attributed to a dense production of plankton, due perhaps to oceanographic conditions.

The vessel's operators say that since the shrimp are called "phantom shrimp," they may again disappear suddenly. However, if present conditions continue, it will be possible to catch about 3,000 tons. (Fishery Attaché, U. S. Embassy, Tokyo, Aug. 9.)

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## VESSELS ADVISED TO AVOID CLOSED AREAS OFF U. S. PACIFIC NORTHWEST

The Japanese Fisheries Agency has advised the governors of prefects to instruct vessel owners to avoid fishing in the 6 restricted areas off the U. S. North Pacific Coast specified in the U. S.-USSR Fishery Agreement. The advice was given along with the Agency's licensing of exploratory trawl operations in the eastern Pacific east of 135° W. longitude, between 50° N.-10° N. latitudes (Vancouver to Costa Rica), during September 1, 1967-August 31, 1968.

Vessel owners were informed that while they were not subject to operational restriction outside the U. S. 12-mile fishery limit under the Japan-U. S. Fishery Agreement, their involvement in a dispute in the closed areas might adversely affect future negotiations between Japan and the U. S. ("Shin Suisan Shimbun Sokuho," Aug. 29.)

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## CANNED MACKEREL AND SARDINES CONSIGNED TO SALES COMPANY FOR EXPORT

Data of the Japan Export Canned Mackerel and Sardine Packers Association show that canned mackerel and sardines consigned to the Sales Company during April 1-June 30 of business year 1967 (April 1967-March 1968) totaled 139,856 cases. They consisted of 167,276 cases of canned mackerel and 72,580 cases of canned sardines.

| Business Year1/ | Quantity Consigned | |
|---|---|---|
| | Mackerel | Sardine |
| | (Cases) | |
| 1966 | 463,218 | 139,328 |
| 1965 | 775,273 | 80,240 |
| 1964 | 866,464 | 40,669 |
| 1963 | 568,550 | 34,542 |
| 1962 | 549,306.5 | 109,994 |
| 1961 | 756,476 | 472,183.5 |

1/Begins April 1 and ends March 31 of following year.

Export has been reported normal, but trading firms are concerned over recent reports of deteriorating foreign currency situation in the Philippines. ("Suisancho Nippo," July 5; "Kanzume Nippo," July 6.)

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## CANNED PINK SALMON PRICES ARE UNCHANGED

The mothership committee of the Salmon and Crab Canners Association decided on June 30 not to change the export prices of canned pink salmon. They are US$14 a case of 48 No. 2 flat (half-pound) and $7.65 a case

Japan (Contd.):

for No. 3 flat (quarter-pound). The land-based canners committee made the same decision on June 26. In 1965, the price per case of No. 2 flats was $12.25; in 1966, it was increased to $14.

Because of international market conditions for No. 2 flat canned pink salmon, it was first believed the 1967 price would be cut 50 cents a case. However, because of the unexpected low production of canned pink salmon by shore canneries, and the drastic price increase for raw fish compared with last year, the Association decided against a price change.

About Half-Million No. 3s

Many believed there should be little difference in price between No. 2 and No. 3 cans--but because of the large production of No. 3s, it was considered inadvisable to change the price. Depending upon future sales, there was some chance that the price would increase later in the year. It would also depend on the size of pack in the U. S. and Canada.

The production of No. 3 flat cans from shore canneries will probably be about 500,000 cases. The pack of No. 2 flats is expected to be about 200,000 to 250,000 cases. Consignment of canned pink salmon to the Joint Sales Company was about 200,000 cases of all kinds.

The number of cases packed by the motherships for consignment to the Joint Sales Company was not known. It was assumed, however, that since the catch of pink salmon was quite good, a larger number would be consigned than last year. (Fishery Attaché, U. S. Embassy, Tokyo, Aug. 9.)

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## ARCTIC SALMON FISHING IS FAIR

The Japanese firm Hoko Suisan's "Dairin Maru No. 10" (300 gross tons), which operated in the Bering Sea and the Arctic Ocean for about 3½ months, returned to Japan with 30 metric tons of herring and 86 tons of salmon. The herring catch, off Nome, fell far below the 100-ton target because of the late start of operations.

The salmon catch, 87 percent chums and the rest kings, also failed to attain the 100-ton target. Catch rate for salmon was less than two fish per "tan" (unit of gear), or about one-half that normally obtained in mothership-type operations.

Both the quantity of salmon catch, and area of fishing (166° W.-169° W. longitudes and 66°30' N.-67° N. latitudes), were about the same as the 1966 operation by the firm's smaller vessel, "Dairin Maru No. 8" (215 gross tons). Despite the discouraging results, the company hopes to conduct further test operations to gain better knowledge of the resources' potential. ("Shin Suisan Shimbun," Sept. 4.)

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## BOTTOMFISH CATCH IN BERING SEA IS GOOD

Japanese mothership-type bottom trawl fleets in the Bering Sea were harvesting an abundance of bottomfish. Data prepared by the Northern Waters Bottomfish Council showed landings by 14 motherships and over 170 accompanying trawlers reached 463,000 metric tons on July 26. This exceeds by far the comparable 1966 landings of 265,000 tons.

| | Catches through July 26 | |
|---|---|---|
| | 1967 | 1966 |
| | (Metric Tons) | |
| Flatfish | 47,000 | 25,000 |
| Cod | 22,000 | 14,000 |
| Alaska pollock | 339,000 | 174,000 |
| Sablefish | 5,000 | 4,000 |
| Pacific ocean perch | 22,000 | 24,000 |
| Herring | 23,000 | 19,000 |
| Shrimp | 3,000 | 2,000 |
| Others | 2,000 | 3,000 |
| Total | 463,000 | 265,000 |

Total production for 1967 was expected to surpass the 1961 record of 623,000 tons. Alaska pollock and flatfish catches were almost double last year's landings. The high production this year was attributed to greater concentration of effort on Alaska pollock for processing into minced meat (ingredient for fish sausage). ("Suisan Keizai Shimbun," Aug. 4.)

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## TRAWLER FLEET WILL FISH NORTHEAST PACIFIC OCEAN

The Japanese fishing firm Hokuyo Suisan was scheduled to send its factoryship "Koyo Maru No. 2" (3,432 gross tons) and two 300-ton trawlers to the northeast Pacific Ocean in September. The fleet was to conduct

Japan (Contd.):

experimental trawl fishing off Washington and Oregon until November 10. The fleet was assigned a catch target of 1,500 metric tons of bottomfish. It was to fish for hake, cod, Alaska pollock, and Pacific ocean perch. The fish will be processed aboard the factoryship into fish meal and minced meat. Hokuyo Suisan sent the "Koyo Maru No. 2" fleet instead of its originally planned "Kazushima Maru" (3,757 gross tons) mothership and 6 trawlers.

3 Firms Licensed

The firm is one of 3 licensed by the Fisheries Agency to conduct experimental trawl operations in the eastern Pacific east of 135° W. longitude, between 10° N.-50° N. latitudes (off North and Central U. S. coasts). Of the other two, Nihon Suisan planned to send the 7,163-ton mothership "Kashima Maru" on October 1. The vessel was being equipped with meal and minced meat plants. Fleet departure plans for the third firm, Taiyo, have not yet been reported. ("Shin Suisan Shimbun Sokuho," Aug. 30; "Suisan Tsushin," Aug. 23.)

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## FISHERY MISSION RETURNS FROM MAURITANIA AND SPAIN

The Japanese private fishery mission sent to Mauritania and Spain on a one-month fact-finding tour of the exclusive fishery zones established by those countries returned to Japan August 1. Its purpose was to sound out Mauritanian and Spanish government and industry leaders about bilateral fishery agreements with Japan to permit the latter's fishing within their claimed waters.

What Mauritania Wants

Discussions with Mauritanian officials revealed that they would agree to Japanese fishing inside the restricted zone without assessing entry fees if Japan would extend the following technical aid: (1) train Mauritanian vessel crews; (2) help repair vessels and fishing gear; (3) help build and operate cold storages and market fishery products; and (4) send fishery consultants. The number of Japanese fishing vessels to be licensed by Mauritania would depend on the extent of fishery cooperation. The Japanese industry is reported studying this proposal.

Talks With Spain Unsuccessful

Talks with Spanish officials concerning recognition of Japan's past fishing in Spain's claimed waters were unsuccessful despite Japanese offers of technical and economic cooperation. ("Suisancho Nippo," & "Suisan Tsushin," Aug. 3.)

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## SCHEDULE COASTAL FISHERY RESOURCE SURVEY OFF PERU

At Peru's request, the Japan Fisheries Society was preparing to send a vessel to explore the fishery resources off the former's coast. The request followed a Japanese fishery team's survey in March. The team's purpose was to determine the feasibility of harvesting Peru's unutilized fishery resources and developing a seafood processing industry.

By establishing such an industry, Peru hopes to enrich the nation's diet with protein. At the same time, the industry would provide off-season fishing for the anchovy fishermen.

The Japan Fisheries Society planned to send a 550-gross-ton trawler to be jointly operated by 4 Japanese firms. Peruvian researchers will participate in the survey scheduled to begin in late 1967 and continue for about 6 months. ("Shin Suisan Shimbun," Aug. 21.)

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## SETS UP DISTANT-WATER FISHERIES RESEARCH LABORATORY

The Japanese Fisheries Agency announced that a Distant-Water Fisheries Research Laboratory has been set up at Shimizu. It is headed by Dr. Hiroshi Yabe, former director of Nankai Regional Fisheries Research Laboratory.

The new laboratory will undertake research on tuna, salmon, trawl, and other distant-water fisheries.

The Nankai Laboratory, which formerly conducted tuna research, was merged with the Naikai (Inland Sea) Regional Fisheries Laboratory. It was renamed Nansei (Southwest) Regional Fisheries Research Laboratory.

Japan (Contd.):

It will be headed by Dr. Takashi Ino, former director of the Inland Sea Laboratory. ("Suisancho Nippo," Aug. 2.)

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WESTERN BERING SEA
TANNER CRAB FISHING IS GOOD

Taiyo Fishing Company's factoryship "Banshu Maru No. 5" (3,567 gross tons) and 2 catcher vessels conducted exploratory tanner crab fishing in the western Bering Sea off Cape Olyutorski, Kamchatka Peninsula. They caught close to 200 metric tons during two months of operation beginning in June. The test fishing has revealed the possibility of full-scale commercial operations. The catch is processed aboard the factoryship. Leg meat in the shell is packaged and frozen for shipment back to Japan for sale there. Taiyo plans to can the meat and market the product experimentally.

Another Firm Fishing

A second Japanese fishing firm, Kokusai Gyogyo, is also doing experimental tanner crab fishing with its factoryship "Seifu Maru" (8,269 gross tons) and two other catcher vessels. Its production as of early August was around 200 tons. ("Suisan Tsushin," Aug. 2.)

## Southeast Asian Fisheries Center Planned

Thirty delegates from 7 Southeast Asian countries met for a week in Singapore in August to talk about the development of a fisheries center to be established in Singapore.

Singapore's Minister for National Development told the delegates that rapid development in Southeast Asia could best be achieved through close cooperation and mutual understanding. The minister expressed appreciation for the Japanese Government's initiative concerning the proposed center, for which Singapore offered the site and research facilities. Although the region possesses abundant natural resources, he said, full use has not been made of them.

Japanese Leader Elected Chairman

The leader of the 9-man Japanese team was elected chairman of the meeting. Other delegates came from Thailand, Singapore, Indonesia, Malaysia, Philippines, South Viet-Nam, and one observer from the Food and Agriculture Organization.

Although Burma, Cambodia, and Laos accepted invitations, no delegates attended. ("The Yomiuri," Aug. 2.)

## India

U. S. OFFERS OCEANOGRAPHIC RESEARCH VESSEL

The U. S. Department of State and the National Science Foundation (NSF) announced on June 8 that President Johnson has approved a proposal to transfer the "Anton Bruun," an oceanographic research vessel owned and operated by NSF, to India. Indian representatives will survey the ship and conduct technical discussions with NSF about the proposed transfer later this year.

Formerly Presidential Yacht

The Anton Bruun, formerly the Presidential yacht "Williamsburg," was built in 1930. In recent years, it has been operated as a biological oceanographic research ship. Dur-1963-1964, it participated in the International Indian Ocean Expedition. Thirteen nations, including the U. S. and India, cooperated in this first comprehensive study of the Indian Ocean. The vessel will be used by the Indian Government for oceanographic research. (U. S. Department of State "Bulletin," July 3.)

## South Korea

REPORT ON FISHERY TRENDS

Two major events have occurred in Korean fisheries during the past 2 years: the Normalization Treaty with Japan, and establishment of an Office of Fisheries, a semi-autonomous agency responsible to the Ministry of Agriculture. The new office is the consoli-

South Korea (Contd.):

dation of 5 offices dealing with fishery matters. It will provide institutional facilities to carry out the Second 5-Year Plan. Under the plan, US$53.4 million--mainly Japanese reparations grants but including credits and commercial loans--have been earmarked for fisheries development.

Aquiculture, stimulated by the U. S. Agency for International Development (AID), is increasing rapidly. Production of seaweeds and laver (mainly for export) has increased greatly. Shrimp production also has expanded through the increase in number of rearing ponds on the west coast; this was achieved principally with private capital. A seed oyster industry is well underway, but technical problems make U. S. aid necessary. First shipments for export were made in 1966, but the results were disappointing.

In coastal fisheries, additions to the fleet (rather small vessels of 15 to 20 tons) were not followed by an expansion of processing facilities.

Most Activity in High-Seas Fisheries

Most activity and most problems have occurred in the high-seas fisheries. The fleet has increased rapidly with additions of 90 Government-owned and 75 privately owned vessels, mostly tuna long-liners. However, Korea does not have a support vessel to service these fleets operating now in the Pacific, Indian, and Atlantic Oceans. So she has had to use hard currencies to buy bait and supplies abroad.

Government-owned vessels were not operated efficiently, and a Korean-U. S. survey team recommended that these vessels be transferred to private ownership. The Government has announced that half the 90 vessels will be transferred to private owners during the second half of 1967.

To expand shrimping operations, Koreans are planning a joint venture with Malaysians (on Penang and Sarawak) and Indonesia.

A major recent feature of U. S. aid is the Tuna and Mackerel Project. A feasibility study of this project is expected to be finished in early 1968. Under the project, a large processing complex (including a cannery, cold-storage, and fish meal plant) will be built on Cheju Island. A U. S. company will participate in the joint venture that was designed to enable Korea to utilize a large quantity of mackerel from "joint Japan-Korea fishing zone" in the Sea of Japan, and to begin a pole-and-line skipjack and yellowfin tuna fishery with tuna clippers in the South Pacific.

Another major feature of U. S. aid is the provision of technical teams to advise on specific problems. One team has already completed its survey. It established that there are good possiblities for developing salmon runs in Korean rivers and expanding trout production. Other surveys in the near future will include oyster production, pollution control, and management of fishery resources. (U. S. AID, Seoul, Aug. 16.)

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## FIRST JAPANESE PRIVATE FISHERY LOANS TO SOUTH KOREA ARE APPROVED

The Japanese Ministry of International Trade and Industry (MITI) has decided to approve the export of fishing vessels through a loan applied for by Kanematsu-Gosho and Matsuoka Shoten, Moji. MITI has been examining the individual private loans to be granted South Korea for plants and fishing vessels under the agreement for Economic Cooperation. This export of fishing vessels will be the first under the private fisheries cooperation fund of US$90 million of a total $300 million for private loans to Korea.

The two fishing vessel loans approved are for 4 tuna vessels (300-ton class) valued at $992,000 exported from Kanematsu-Gosho to Saito Industries--and for 10 trawlers (120-ton class) valued at $1,790,000 exported from Matsuoka Shoten to Shinko Freezing Co. (Shinhung Refrigeration Co. Ltd., in Korea).

Japan Pledged Long-Term, Low-Interest Loans

During the Japan-S. Korea negotiations for a fisheries agreement, in December 1964, the Japanese Government pledged that the private loans to improve the efficiency of Korean fisheries would be long term at a low interest rate. Later, the 2 countries agreed that down payment would be 10 percent, the interest rate 5.75 percent per year, and repayment deferred for 8 years. The terms for the MITI-approved loans follow this agreement.

South Korea (Contd.):

After diplomatic relations between the 2 nations became normal, the Japanese Government approved the export to S. Korea, by private loan, of 31 heavy industry plants to manufacture textiles, cement, and fertilizer worth around $160 million. The loans are nearing the original limit for grants on $180 million. But there has been much delay in approving private fisheries loans under the $90 million--and shipping loans under the $30 million--allocations.

Some points in the agreement need to be adjusted. The 2 governments will discuss ways of administering similar grants in the future. (Fishery Attaché, U. S. Embassy, Tokyo, August.)

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STUDIES CLAIM TO CONTINENTAL SHELF

South Korea is considering claiming sovereign rights over her Continental Shelf, according to the Japanese Fisheries Agency. South Korea's president recently ordered a study of the problems involved.

The Convention on the Continental Shelf, effective June 10, 1964, provides that coastal states shall exercise jurisdiction over the Shelf resources. These include mineral and other nonliving resources of the seabed and subsoil, and living organisms belonging to the sedentary species. Principal signatories are the U. S., USSR, Great Britain, Denmark, and Australia.

Japan, which is not a signator, fears that if South Korea claims the Continental Shelf and shellfish and bottomfish resources, it would seriously jeopardize Japanese trawl fishing in the Korea Strait and the Yellow Sea. ("Suisan Keizai Shimbun," July 24,and other sources.)

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SHRIMP CULTURE SUPPLEMENTS CATCH

The Shinhung Company, largest processor of Penaeid and Pandalid shrimp in S. Korea, does 90 percent of its business in shrimp, mostly frozen for export. To supplement the catch, the company began to culture Penaeid shrimp in 1966 near Keya Island, Cholla Namdo, on the west coast.

Ponds covering 35,000 pyong (1,260,000 sq. ft.) were constructed. The culture methods follow the techniques of Dr. Fujinaga in Japan. The gravid females are caught near the farm and transferred to a pond. In 7 to 10 days, the shrimp spawn and the adults are removed. Nutrients are added to the water to produce plankton to feed young larvae. Crabs are collected from nearby beaches and chopped to feed the young.

3 Million Shrimp Reared

In 1966, the company reared 3,000,000 young shrimp and sold two-thirds of them (about 1 inch long) to fishery cooperatives for 1 won (0.4 U. S. cent) each. The remainder was reared to market size (about 10/pound heads on) in about 6 months from spawning. The first year's operation was not economically successful. The 1967 plans specify rearing 3,000,000 shrimp to market size. Because of the larger number, the cost per shrimp should be low enough to assure a profit. (U. S. Embassy, Tokyo, Aug. 1.)

Note: 267 Korean won equal US$1.

NOTE

In the August-September 1967 issue, p. 54, Commercial Fisheries Review said of a North Pacific shrimp operation contemplated by a South Korean company: "Negotiations are underway to make the venture, scheduled to begin in November 1967, a joint enterprise with Bumble Bee Seafood of Astoria, Wash."

CFR has been informed that Bumble Bee is not associated with this venture.

## Thailand

REPORT ON THAI FISHERIES

The Thai Department of Fisheries budget increased from 8 million baht (US$400,000) in 1962 to 75 million baht (US$3,750,000) in 1967. The increase was stimulated by increased marine fisheries. These fisheries demand more research and larger investments than fresh-water fisheries, where Thailand already has done much research.

Marine landings more than doubled in the 1960s--from 273,000 metric tons in 1962 to over 533,000 in 1965 (most recent data available). Despite the large increase, the value of marine landings increased only by about 20 percent--from $45.9 million to $56 million.

Thailand (Contd.):

Thai demand for traditional, highly valued fresh-water species (carps, air-breathers, etc.) is strong. Although the production of these species (66,300 metric tons in 1962 and 81,700 tons in 1965) is much smaller than marine fish, their value is relatively high--$24 million in 1962 and $32.3 million in 1965.

Joint Survey With Malaysia

The Thai Fisheries Department recently carried out a cooperative trawling survey with Malaysia off the latter's coasts. The results are available to both countries, but it appears that Thai trawlers may be fishing in the explored area before Malaysian. The joint survey was completed as part of the UN-sponsored cooperative study of the Kuroshio Current (CSK).

Thailand is conducting research with 2 larger vessels--"Fisheries Research No. 1" and "Fisheries Research No. 2," constructed in Japan with reparations funds--and 5 smaller, wooden research vessels built in Thailand. These 7 vessels were constructed between 1963 and 1967. Most research is in the Gulf of Thailand for both pelagic and demersal species. (John C. Marr, BCF Hawaii Area Director.)

## Taiwan

1966 FISHERY LANDINGS SET RECORD

Taiwan's fishery landings (including marine, fresh water, and fish culture) in 1966 reached a record 425,000 metric tons-- 43,000 tons above 1965's. This increase of 11.4 percent is one of the world's highest. Since the early 1950s when her fishing fleet was rehabilitated, modernized, and expanded, Taiwan has increased her fishery catches steadily.

As the high-seas and outer coastal fisheries expanded in the last 15 years, the relative importance of the different fisheries changed greatly (table 1).

Under her 5-Year Plan (1962-1967), the Chinese Government set the 1966 goal at 400,000 metric tons. It was surpassed easily by 25,000 tons, or 6 percent, despite below-quota catches in inner-coastal fisheries. But increases well above the goals in high-seas and outer-coastal fisheries offset these below-quota catches.

Table 1 - Taiwan's Landings by Type of Fishery for 1951, 1961, and 1966

| Type of Fishery | 1966 | | 1961 | | 1951 | |
|---|---|---|---|---|---|---|
| | Metric Tons | % | Metric Tons | % | Metric Tons | % |
| High-seas | 169,260 | 39.8 | 106,147 | 34.0 | 16,330 | 15.6 |
| Outer-coastal | 172,267 | 30.5 | 117,405 | 37.6 | 27,595 | 26.5 |
| Inner-coastal | 25,239 | 5.9 | 31,533 | 10.1 | 35,288 | 33.9 |
| Fish culture | 58,511 | 13.8 | 57,354 | 18.3 | 24,965 | 24.0 |

Outer-Coastal Fisheries Largest

The outer-coastal fisheries still supply the largest portion of total landings, but the rapid growth rate in high-seas fisheries (about 300 percent since 1956) threatens that fishery's position. In 1966, high-seas fishing contributed almost 170,000 metric tons, or 39.8 percent, to the total catch.

The inner-coastal fisheries (conducted within 5 nautical miles of shore with small nonmotorized sampans and bamboo rafts) are declining. In 1956, that fishery contributed almost one-fourth of all landings; in 1966, only 5.9 percent. The reason for this decline is two-fold: the primitive fishing methods (beach seining, torch-light fishing, angling, gill-netting, etc.) cannot compete with modernized outer-coastal fisheries that attract fishermen because of higher earnings. Second, the resources near the coast are not as abundant as they used to be.

Culture of Fish and Shellfish Declines

Culture of fish and shellfish has declined in relative importance during the last decade because of the rapid expansion of marine fisheries. Still, its progress, though modest, has been steady. Production from fish culture doubled from 1951 to 1960, and by 1966 increased another 20 percent. Many new species are being cultivated (including rainbow trout, jamato carp, and bullfrogs), but the principal species remain milkfish, tilapia, and oysters. Fish is cultured throughout the island, but especially on the western coast. It is not unusual to harvest 2 or 3 crops a year since fish grow rapidly in Taiwan.

Importance of Various Species Changes

The relative proportion of various species in the total catch also has changed significantly.

Taiwan (Contd.):

Herring and allied species, commercially known as sardines, used to provide the largest tonnage in marine landings. In 1966, tuna became No. 1. Tuna landings in 1966 were double 1965's and were surpassed only by the traditionally large crop of milkfish.

Purchases of new long-liners will help to expand tuna fisheries this year. Tuna are highly valued domestic food and the principal fishery export item.

Lizardfishes, the leading species landed by trawlers (mostly bull or pair-fishing) are caught year-round. The peak season is November through April. Catches increased rapidly since 1953 and tripled during last decade.

Cuttlefish became significant only recently. In 1960, only 4,500 tons were landed, compared to over 18,600 tons in 1966. Both cuttlefish and squid are commercially important in Taiwan's fisheries; both are widely distributed in coastal and offshore waters. Many of these mollusks are taken incidental to trawling for fish.

Shark landings were the second major marine species landed as late as 1960. They have lost their relative significance, although the catch increased from 14,300 tons in 1960 to 18,100 tons in 1966. Much of the increase probably is due to expanded tuna long-lining and good demand for dried shark fins, a delicacy much used in Chinese cooking.

Fleet Changed Considerably

Taiwan's fishing fleet has changed considerably during the last two decades. Damage to fishing vessels during World War II was extensive, especially to motorized ocean-going vessels. During 1950-60, the fleet increased from over 21,000 vessels to over 28,000. During the 1960's, however, the impetus was in building larger vessels; the fleet size decreased to about 25,000 in 1966 (see table 2).

Table 2 - Taiwan's Fishing Fleet, 1955, 1960 and 1965-66

| | 1966 | 1965 | 1960 | 1955 |
|---|---|---|---|---|
| Motorized vessels: | | | | |
| Number | 8,842 | 8,167 | 5,541 | 2,758 |
| Gross tonnage | 141,980 | 117,883 | 78,343 | 41,417 |
| Horsepower | 379,067 | 308,692 | 178,272 | 81,506 |
| Non-motorized sampans: | | | | |
| Number | 4,923 | 4,871 | 5,917 | 8,083 |
| Gross tonnage | 6,529 | 7,011 | 9,121 | 12,583 |
| Non-motorized rafts: | | | | |
| Number | 11,105 | 11,570 | 16,587 | 13,528 |

On the other hand, total gross tonnage increased from 32,500 gross tons in 1950 to over 148,000 gross tons in 1966. The increase was in motorized vessels; the tonnage in nonmotorized vessels decreased by 50 percent as more units were retired or equipped with motors. Nonmotorized vessels--sampans and bamboo rafts--are used exclusively in the inner-coastal fishery.

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WORLD BANK TO FINANCE TAIWAN'S PURCHASE OF TUNA VESSELS

The World Bank will provide foreign exchange to Taiwan needed to add 20 tuna long-liners and 4 stern trawlers to her deep-sea fishing fleet. It was made possible by a US$14.4 million loan at 6 percent annual interest for 15 years. The remaining $3.3 million of the estimated cost of $17.7 million will be provided by Taiwanese fishing companies.

Taiwan will relend the World Bank money through the Land Bank of Taiwan. The companies will begin repayment on the loan in August 1970. ("The Wall Street Journal," June 15.)

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TUNA EXPORTS TRIPLED IN 1966

In 1966, the Republic of China exported 23,230 metric tons (worth about US$2.1 million) of her tuna landings. Both the exported quantity (mostly frozen) and value were over 300 percent greater than in 1965. ("Taiwan Industrial Panorama," April.)

## Hong Kong

HONG KONG IMPORTS 2/3 OF FISHERY PRODUCTS FROM COMMUNIST CHINA

In 1966, over 64 percent of all Hong Kong fishery imports came from Mainland China. They were worth US$21.1 million. Communist China has exported fishery products to Hong Kong since the early 1950's. There was a large increase in 1964, when Chinese exports reached $18.7 million--68 percent higher than 1963.

Hong Kong (Contd.):

Since then, the yearly increases in value were more modest: about 13 percent from 1964-1966.

It is believed that Hong Kong fish traders re-export some fishery products. (U. S. Consulate General, Hong Kong.)

## Singapore

DEVELOPS HER FISHERIES

The first part of a multimillion-dollar complex, aimed at making Singapore self-sufficient in fisheries products, has been completed on the Jurong River's west bank. The 39-acre Jurong fishing port will have docks 700 feet long and be capable of accommodating the largest fishing vessels. The docks will be connected with a covered auction market, capable of handling 150 metric tons of fish daily, and an icemaking plant.

The Singapore Government expects that domestic as well as foreign vessels will use the new port.

Singapore is one of the Asian ports used extensively for bunkering by Soviet fishing and whaling vessels. ("Asahi Evening News," July 10.)

## Malaysia

SABAH STATE'S SHRIMP LANDINGS AND EXPORTS RISE

Landings of shrimp by the East Malaysian State of Sabah increased almost 50 percent from 1965 to 1966: from 1,659 metric tons to 2,407. This year's plan calls for a catch increase of about 600 tons; it is estimated that 3,000 tons of shrimp will be landed. During 1967-1970, annual increases of about 660 tons are expected to produce 1970 landings of 5,000 tons.

Total Exports Up

While the shrimp catch increased by about one-half from 1965 to 1966, Sabah's total fishery exports increased by over 70 percent--from 3.5 million to 6.1 million Malaysian dollars. This indicates an increased export price for shrimp, or a greater proportion of exports of other fishery products.

Exports of fish and shrimp for the first 4 months of 1967 were M$2.4 million. If the increased rate for the rest of the year remains proportionately the same, total exports of fish and shrimp will be M$7.2 million, about 1 million above 1966's. The projected 1967 increase in the value of exports will be only about 15 percent, much below the 1966 rate of increase.

Note: $3.048 Malaysian dollars equal US$1.

## Pakistan

EXPORTS TO U. S. INCREASED 25%

Exports of shrimp from Pakistan to the U. S. increased more than 25 percent from 1965 to 1966. In 1966, they reached about 8.5 million pounds, mostly frozen shrimp.

Shrimp Exports to U. S., 1966

| Item | Quantity 1,000 Lbs. | Value Million US$ |
|---|---|---|
| Frozen fish & shrimp (mostly shrimp) | 7,965 | 6.6 |
| Dried | 650 | 0.4 |
| Canned | 140 | 0.1 |
| Total | 8,755 | 7.1 |

Pakistan exported almost 9 million pounds of frozen fish and shrimp (mostly shrimp) in 1966; almost 90 percent went to the U. S.; Japan and Afghanistan were the other principal markets.

Dried shrimp exports totaled 1.3 million pounds, half for the U. S.; most of the remainder went to Hong Kong or Kuwait.

Canned shrimp is the only product for which the U. S. is not the major market; only 14 percent of the 975,000 pounds exported went to the U. S. The United Kingdom purchased almost six times as much. (Marine Fisheries Department, Pakistan.)

# AFRICA

## South Africa & South-West Africa

### FISH MEAL AND OIL PRICES DROP

The 1967 South African fishing season was good through May, according to the annual report of a major processor. Mackerel contributed most to the increased catches. This species is not entirely suitable for canning, so the greater part of the catch was converted to fish meal.

Because Peru's production in early 1967 was exceptionally high, fish meal prices for this year are expected to be about US$112 a short ton, compared to $133 in 1966.

The indicated 1967 price for fish body oil is between $133 and $137 a long ton; it was $181 in 1966. Judging by first-quarter 1967 production reports, however, the oil yield from available fish supplies is likely to increase during the year. A yield of 8 gallons a ton of fish was recorded in 1966. This need only rise to 11 gallons a ton to offset the price difference.

Most 1967 Production Sold Lower

The chairman of another company reported that most 1967 fish meal production had been sold forward at reduced prices. This year's prices are unlikely to exceed $115 a ton, f.o.b. Walvis Bay. He noted an encouraging increase in the percentage of fish meal put into balanced feeds on world markets. This resulted from the present more favorable cost of fish meal against vegetable proteins and synthetics.

The 1967 production of fish body oil was sold forward at 20 percent lower prices than last year. Increased sales of canned fish were expected at higher prices because of increasing demand in local and export markets. ("Barclays' Trade Review," July.)

## South Africa

### SHOAL FISH CATCH IS UP

The Cape west coast shoal fish catch in the first 5 months of 1967 was 71,118 short tons of pilchards, 8,940 tons maasbanker, 153,095 tons mackerel, 134,243 tons anchovy, and 13,966 tons red-eye herring. Total catch was 371,363 tons.

In the 1966 period, total catch was 234,481 tons: 108,765 tons pilchards, 13,457 tons maasbanker, 61,233 tons mackerel, 46,123 tons anchovy, and 4,903 tons red-eye herring.

In 1965, the total catch was 313,874 tons: 206,720 tons pilchards, 30,575 tons maasbanker, 43,967 tons mackerel, 32,612 tons anchovy, and 100 tons red-eye herring. ("The South African Shipping News and Fishing Industry Review," July.)

* * *

### AUSTRALIA IS GOOD MARKET FOR SOUTH AFRICAN SHRIMP

South Africa has high hopes of developing a market in Australia for shrimp caught on newly discovered grounds off Durban. Shrimp from this new source also could go a long way toward filling the gap left by Australian exports of her largest shrimp to the U. S. and Japan.

The managing director of an Australian company said the new product was a small variety of shrimp and was peeled. It would be sold in both consumer and catering packs under the "Ocean Fresh" label. He said there was a very healthy demand in Australia for the small or cocktail shrimp meat.

For many years, South Africa has been a very good customer of Australia for large shrimp. (Australian "Fish Trades Review," June).

## South-West Africa

### SOUTH-WEST AFRICA FISHERIES DEVELOPMENTS

The executive committee of the South-West African Administration has approved some suggestions by the Committee of Inquiry into the Fishing Industry. These in-

South-West Africa (Contd.):

clude the proposal to build a new fishing harbor at Walvis Bay. Committee approval means the suggestions will be carried out.

The Prime Minister announced recently that South Africa was negotiating with several countries to convene a conference to consider fishing in the South Atlantic. The executive committee then decided that if foreign fishing in South-West African waters were not curbed by international agreement, the committee would consider using South-West Africa's total resources to exploit these waters as quickly as possible.

Committee Approves Recommendations

The committee approved recommendations to supervise fishing activities more closely; ban export of frozen sardines for canning; restrict number of fishing vessels licensed, with allowance for larger vessels than at present; ban export of live spiny lobster. The committee recommended additional research and the construction of a white fish processing factory.

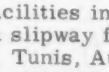
Newspapers have reported that 3 major South African fishing companies have been excluded from the new 48,000-ton fishing quotas issued by the South-West African Administration. The reason apparently is that they operate 2 factoryships off South-West Africa in competition with the fish factories at Walvis Bay. The factoryships handle mainly pilchards and operate outside the 12-mile limit. (U. S. Embassy, Pretoria, Aug. 10.)

## Tunisia

NEW FISHING PORT OPENS

On August 11, the President of Tunisia inaugurated a new fishing port built at Mahdia with the aid of West German capital. The West German Secretary of State in the Ministry of Economic Cooperation, visiting Tunisia at the government's invitation, attended the ceremony. West German assistance for this project began in 1963 with a long-term loan of about US$2 million. This aid was increased in 1966 by $250,000.

The port's facilities include refrigeration equipment and a slipway for fishing vessels. (U. S. Embassy, Tunis, Aug. 28.)



## Ivory Coast

FISHERY SURVEY BEGINS

An agreement for the "Survey and Development of Pelagic Fishery Resources," signed on August 18 by representatives of the Ivory Coast and the United Nations Development Program/Special Fund (UNDP/SF), is being put into effect. Its purposes are to help develop coastal pelagic fishery resources through surveys, research, experimental fishing, and personnel training to study the biology of pelagic fish, evaluate stocks, fluctuations, and migration; and to compare catches by different gear.

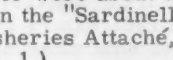
The 4-year program will be financed by a UNDP/SF allotment of US$1,273,000 and an Ivory Coast counterpart contribution of US$906,931. The UN Food and Agriculture Organization (FAO) will carry out the program. A Scotch fishery expert is project director. The research vessel "John F. Kennedy" probably will participate.

Project Is Part of Larger Program

This project is part of an overall UNDP/SF program, the "Sardinella Program," to study the distribution and abundance of "Sardinella" and other pelagic species off the West African coast. The methods suitable to exploit these species will also be studied. The project had been recommended by a special UN Fishery Mission sent in response to a request from governments in the region.

The "Sardinella Program" includes and closely coordinates national SF-supported projects in the Ivory Coast, Senegal, Sierra Leone, and Congo (B). It includes too the SF regional project to survey the pelagic fishes in waters along the West African coast from Senegal to the Congo River, and special SF-fishery projects in Ghana and Nigeria. Experts, directors, and co-directors of each project will collaborate with one another and with the manager of the SF Regional Fishery Survey. This should facilitate exchange of ideas and findings and standardization of equipment and methods so that the overall program can be evaluated properly.

The Assistant Director General of FAO (Fisheries) said at the recent FAO Technical Conference on the Fisheries of West African Countries in Dakar that agreements had been signed, or were about to be signed, on a all projects in the "Sardinella Program," (Regional Fisheries Attaché, U. S. Embassy, Abidjan, Sept. 1.)



## Senegal

1966/67 TUNA SEASON IS DISAPPOINTING

Senegal's tuna catch totaled only 6,500 metric tons when the season ended on May 15--2,200 tons less than in 1965/66. Bad weather was blamed. Most of the 60 Basque and Breton tuna vessels returned to France, but 4 French vessels and Senegal's 5 refrigerated tuna vessels belonging to SOSAP (Societe Senegalaise d'Armenent a la Peche) continued to fish the West African coast as far south as Pointe-Noire off the Congo.

Between May and August, SOSAP vessels made record catches of up to 300 metric tons a month per vessel. SOSAP anticipated a total catch of as much as 2,000 tons by the end of August. The tuna were frozen and stocked at SOFRIGAL in Dakar. They were to be turned over to one of Dakar's 3 canneries, scheduled to reopen in September, to process the fish for export to France. Senegal's canning season normally runs from mid-November through mid-May.

Industry's Future Discussed

The future of the tuna industry is still a matter of discussion and speculation. There appears to be general agreement that construction of the 15,000-20,000-ton capacity Soviet tuna complex has been postponed indefinitely. It is expected that SOSAP will acquire 14 new freezer tuna vessels (10 from the Soviet Union and 4 from France) by 1970, bringing its fleet up to 19. Nevertheless, there are numerous unresolved financing problems.

Besides 14 vessels on order, there is considerable discussion about the prospect of more vessels. Government sources have indicated that SOSAP will have 39 modern freezer tuna vessels by 1974, or an additional 20. The Government hopes to use the credits extended by the Soviet Union for a tuna cannery (about $3.2 million) to purchase instead 13 more freezer tuna vessels. At the same time, SOSAP would buy 7 more vessels from France--and have a modern fleet of 39 tuna vessels and a landing capacity of 20,000 tons a year.

Private industry sources discount some of these plans. They say the Government will have great difficulty finding money for even the 14 vessels on order. Moreover, they believe there is little likelihood that the tuna canneries could sell any tuna outside their protected French quota (11,000 tons in 1966/67) at a profit. (U. S. Embassy, Dakar, June 27 and Aug. 21.)

## Togo

REPORT ON 1966 FISHERIES

Despite its coastal location and closeness to good fishing grounds, Togo in Northwest Africa is able to satisfy its food fish needs only through imports. The 1966 trend in fish imports, as in previous years, was up. Significant imports:

| Fish | 1966 | | 1965 | |
|---|---|---|---|---|
| | Quantity | Value | Quantity | Value |
| | Metric Tons | US$ 1,000 | Metric Tons | US$ 1,000 |
| Fresh fish | 262 | 37 | 694 | 109 |
| Frozen or chilled fish | 3,997 | 590 | 4,096 | 628 |
| Dry, smoked, or salted | 2,024 | 863 | 1,002 | 353 |
| Total | 6,283 | 1,490 | 5,792 | 1,090 |

Soviet Vessels Provide Imports

In 1966, virtually all fresh and frozen or chilled fish imported into Togo came from Soviet fishing vessels and factoryships that appear frequently off the Lome wharf. Nearly three-quarters of the imported dry, smoked, or salted fish came from Ghana in 1966. Fish exported from Togo in 1966 amounted to only 8.8 tons, worth about $4,300.

Fishing Developments

In other fishing developments, West Germany continued her aid to Togo's Service de Peche throughout 1966. A fishing trawler was presented as part of this program early in the year. The boat has not performed satisfactorily. It will be replaced this year with a vessel more suited to Togo's conditions.

With the 1967 opening of Lome's new port, fishing vessels will be protected from the open sea while at anchor, increasing Lome's attractiveness as a potential commercial fishing port.

The Peace Corps inland fisheries project begun in 1965 is proving to be a success. More volunteers were added toward the end of 1966. (U. S. Embassy, Lome, June 30.)

# ARTICLES

## THE SPONGE INDUSTRY OF TARPON SPRINGS

By Myrtle Ferry

In 1960, Elliot A. Macklow, Chief, Audio-Visual Services, BCF, supervised the production of a sound, color motion picture entitled "Sponge--Treasure from the Sea" for the sponge industry centered in Tarpon Springs, Florida. During film production, Macklow was made to feel part of this sponge fishing community, which is made up of people mainly of Greek ancestry. About 6 years after the motion picture was released, during the filming of another BCF motion picture, Macklow again visited Tarpon Springs. He was welcomed warmly. It was during this recent visit that Mrs. Myrtle Ferry, Secretary of the Tarpon Springs Sponge Exchange, told him about this account of the sponge industry which she had written. The accompanying photographs were taken by Macklow during the 1960 filming.--Editor.

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Although the first record of sponge gathering in Florida dates back to 1822, it was not until later in the century that the domestic sponge became commercially valuable. Many persons in Tarpon Springs, which is about 25 miles northeast of Tampa, on Florida's west coast, had become interested in harvesting sponges. But the prospect for an industry did not appear until the arrival of John K. Chenney.

Chenney was a Pennsylvania Dutchman who came to Florida in 1882 to invest in land. He and some Pennsylvania associates formed the "Lake Butler Villa Company," which bought from the State of Florida sizable acreage in and around Tarpon Springs. It is said that through this venture Chenney acquired some wealth and began to invest wisely. He involved himself in harvesting sponges, but he felt the need for more skilled men and proper equipment.

The second important figure in the story of Tarpon Springs was John M. Cocoris. Born in Leonidion, Greece, in 1878, he was the first Greek to be engaged in the Tarpon Springs sponge fishing industry. He had landed in New York City in 1895 and had gone to work there for the Lembesis Sponge Company. The firm sent him to Tarpon Springs to buy and work up sponges. They were being brought in from the Gulf of Mexico by the "hookers" (small boats) stationed at Bailley's Bluff, about 6 miles from town.

By 1901, two other brothers, George and Louis, had arrived from Greece to work with John. This trio worked the coast from Tarpon Springs to Key West. In 1902, a fourth brother, Gus, joined them. Today, Gus, 85, is the only survivor. He and his wife Metaxia still live in Tarpon Springs. The Cocoris brothers came from a family that operated its own sponge business in Hydra, Greece, and was very familiar with the harvesting of sponges.

### CHENNEY AND COCORISES JOIN FORCES

Chenney had acquired 2 saw mills and was realizing a good income from them. He was shipping sponges all over the U. S. and he hired the Cocoris brothers to expand his operations.

After it was determined that the Gulf of Mexico was rich with the "golden fleece," the Cocorises made plans to import skilled men and diving gear from Greece. In 1904, the first divers, boat helpers, life line tenders, and deck hands arrived in the States. The Cocorises bought their first diving boat, "Eldora," which really was a fishing boat. They converted it into a diving boat and renamed it "Elpis," which in Greek means "Hope."

In February 1905, the Elpis hoisted to her mast a flag of the U. S. and a Greek flag and sailed for the sponge beds in the blue waters. The first diver to go overboard was Demo Kavasilos, who stayed down 10 minutes and brought up his sponge bag full of beautiful wool sponges. His first words were: "There's enough sponges in these beds to supply the whole world." By nightfall, the Elpis returned loaded from stern to bow.

Financed by Chenney, the Cocorises built 5 more diving boats and brought crew after crew from the "old country." By the end of

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the first year, 1,500 Greeks had arrived in Tarpon Springs, many of them bringing their families. They built their own school and church.

As time went on, many local people joined in the sponge business. Tarpon Springs became known as the world's largest sponge center. From the very beginning, there was recognition of the need to conserve this valuable resource.

Many of the boats were christened after distinguished men and saints. During World War II, one was christened "General Papagos," field marshal of the Greek army. Others were "General MacArthur" and "President Roosevelt." There were "Socrates" and "Saint Nicholis." The most recent christening was that of the "John F. Kennedy," a strong and graceful craft. The occasion was impressive and poignant.

## TECHNIQUES OF SPONGE HARVESTING

Two methods of harvesting sponges are used in Florida: hooking and diving. Both methods use a pronged iron hook to detach a sponge from its location. The hooker works in a small dinghy, which is always near the mother boat. He kneels in the bow searching for sponges through a glass bottom bucket. When he locates a sponge on the Gulf bed, he lowers immediately a long pole with the iron hook attached. He measures the sponge for legal size by the width of the hook. If the sponge is 5 inches, the hooker sets the hook into the sponge as near its base as possible and lifts it into the boat. The operation goes on for several days, or until the captain feels he has a good catch and sails for home. If the water is clear, hookers usually work in depths of 30 to 40 feet.

The diving boats working out of Tarpon Springs are of the same design as those used in the Mediterranean. The design was brought to the States by the Greeks several years ago. The vessels are diesel powered and steered by tiller rather than wheel. A crew of 6, two of them divers, is needed to handle the boat, clean the sponges, and provide food. Sponge divers wear a thick rubberized suit with bronze helmet and breast plate. Air is pumped into the helmet by an air pump aboard the boat. The boats are fully provisioned to enable the crew to stay at sea 3 to 6 weeks, depending largely on the weather.

Diving operations are conducted in depths up to 125 feet. As fast as sponges are sent up to the deck by the diver, they are trod on thoroughly by the barefoot crew to crush the soft animal matter and tissues to hasten death. Then they are washed several times with sea water and hung on lines to dry. Back in Tarpon Springs, they are sorted, strung on lines, and stored to await an auction day.

Auctions are held each Tuesday and Friday, if there are sponges to be sold. Each lot is bid on separately and sold to the highest

Fig. 1 - The sponge fleet at Tarpon Springs, Florida.

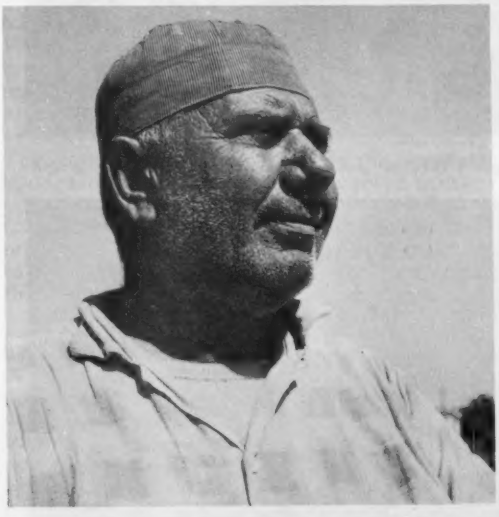

Fig. 2 - Experienced sponge fisherman.

Fig. 3 - Young diver--newly arrived from Greece.

Fig. 4 - The diver goes down, lifeline on left, air hose on right.

Fig. 5 - Diver and sponges surface.

Fig. 6 - On deck, cleaning out the living material.

Fig. 7 - Drying the catch.

Fig. 8 - Six weeks of sponging and a fully loaded boat returns to Tarpon Springs.

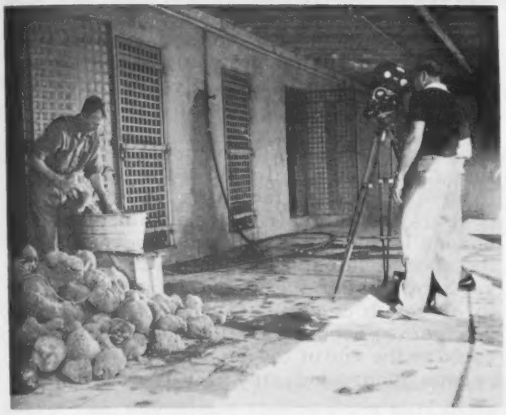

Fig. 9 - Preparing the sponges for auction - during the filming of "Sponge Treasure From The Sea."

Fig. 10 - After trimming, grading the sponges for size.

bidder. The buyers take their purchases to their warehouses, where the sponges are reassorted, trimmed, and classified as to size and quality. Qualities determining commercial value of a sponge are color, size, shape, softness, durability, resiliency, and absorptiveness. This final assortment is done by men who have expert knowledge of the natural sponge.

The best known and most valuable sponge is the Rock Island Sheepwool Sponge, which is unequaled for durability, absorptiveness, and general utility. It is used by chemical companies, schools, janitors, hotels, motels, drug stores, and many other organizations.

## VARIED FORTUNES OF THE INDUSTRY

The sponge industry has suffered many ups and downs. It realized the peak year in 1936, when production reached more than $3 million. Several prosperous years followed. During the good years, the waterfront was a beautiful picture to behold--more than 75 sponge boats, berthed side by side, lifting their prows from time to time as the ripples of the water pushed them up and lowered them back into their berths.

When the crews returned to port, the city was bathed in gaiety. Streets were crowded, faces beamed. Coffee houses buzzed, barbers' scissors clicked--the butcher and baker busy as bees.

During this period, too, the captain-owners of boats were busy taking care of necessary chores and assembling new crews. Boats had to go on ways for general repair, engine overhaul, and new coats of paint. A thorough checkup was made to assure the crew of a boat's seaworthiness. The Captain either "shared" his crew or advanced them more money to care for their families. Food and other necessities were bought. Readiness was the word. All in all, it was a joyous time.

The picture has changed; it has become bleak. Beginning 1943 and running through 1949, the sponge beds suffered a disease known as the "red tide." It all but closed the industry. There were virtually no sponges to be gathered. The minute production of the 1940's went mainly to the Army and Navy. The public was forced to use the synthetic sponge. Many boats were converted to fishing boats. Several were sold and taken to Cuba for lobstering. Those tied to their moorings sank for lack of proper care, never to be raised. A few--12 or 15--survived through the wisdom of their owners.

Gradually, year after year, the sponge beds began to regain their health and became productive again. By 1960, production was up to $425,000 and stayed near this figure until 1966 when it fell to about half. So far this year, a trememdous amount of healthy sponges on the beds wait to be gathered, but production is acutely limited. In fact, this resource needs harvesting badly, else the overgrowth will cause the beds to become dormant and a very rich resource will cease to be. Our present problem is the shortage of manpower.

Population has doubled in the past 6 years. It is now 16,000 including the suburbs. Many Captains are eager to take their boats out to work the beds, but they cannot secure a crew. The older men of the industry are now feeble men and cannot endure the rough sea life. The younger generation does not care to follow their fathers' footsteps--at sea 2 to 3 weeks each trip, away from families, enduring the dangers of a spongeman's life. The old spongeman had a limited education and knew no other way of earning a living; his son has received an education and prefers another profession. Many young people have become teachers; others, the less fortunate ones, are working in the industrial centers.

Louis S. Smitzes, president of the Tarpon Springs Sponge Exchange for the past 24 years, and his Board of Directors have made several appeals to our governmental bureaus for permission to import skilled spongemen from Greece who are willing to come to the States to work in the industry. The bureaus denied the appeals saying that manpower was available here. The most recent appeal was made to the Bureau of Immigration in Miami for Cuban refugees, many of whom no doubt worked as spongemen in Cuba. Just how long the few remaining diving boats now in operation (two of them have been sponging for more than 40 years) can supply part of the demand and keep the industry alive is anybody's guess.

There is a certain amount of overhead that cannot be eliminated if the Exchange is to furnish captains facilities for storage and preparation of their catch. Since the Exchange is sustained by a small percentage of the sponge sales, if production decreases for yet another year the Exchange will be forced to close. It can survive only if skilled spongemen become available. Otherwise, it could be the end of the once colorful and prosperous Sponge Industry of Tarpon Springs.

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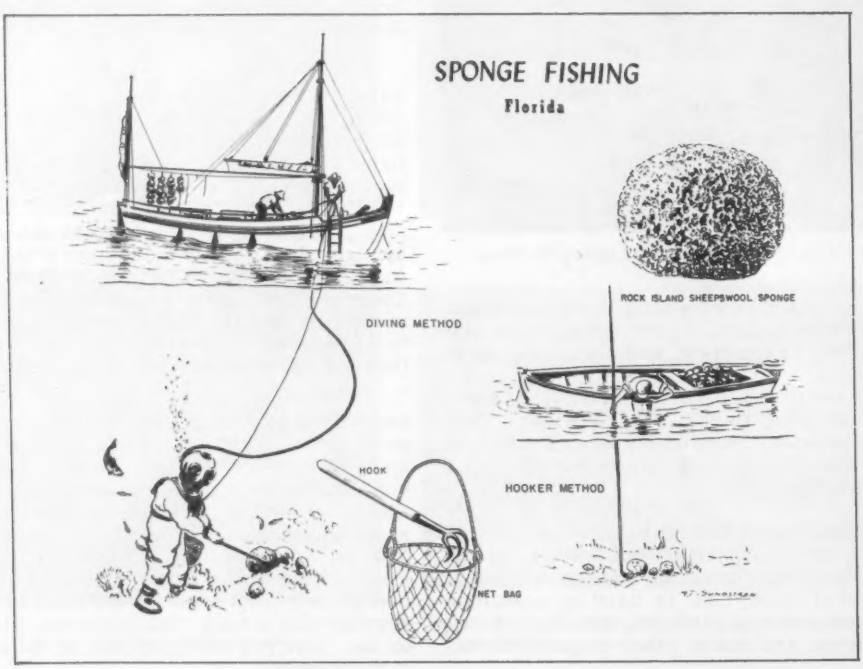
On October 4, the U. S. Employment Service notified Commercial Fisheries Review:

"Applications for alien employment certification were approved for 20 job openings as sponge divers on November 1, 1966, and for 30 job openings as sponge diver helpers on January 1, 1967, for the Tarpon Springs Sponge Exchange, Tarpon Springs, Florida. Since the dates of approval, 15 divers and 18 diver helpers have been certified against these job openings."



# DECK EQUIPMENT LAYOUT ON M/V "DELAWARE" FOR SURF CLAM SURVEY

By Lars A. Fahlen*

The surf clam (Spisula solidissima) has become an important national food source. New Jersey is the largest producer. In 1965, it produced 42,306,687 pounds of surf clam meats worth $3,047,857; in 1966, 42,688,462 pounds worth $3,666,995[1/]. Between 1960 and 1965, the increase in production averaged more than 3,000,000 pounds of meats per year. About 65 vessels--48 to 136 feet long and 14 to 160 tons (fig. 1)--are now operating in this fishery off the New Jersey coast.

## DELAWARE'S FISHING GEAR

The BCF exploratory fishing vessel Delaware was especially rigged for a surf clam survey off New Jersey, Maryland, and Virginia to evaluate the availability and abundance of surf clams. Her equipment differed from that of commercial boats because she is longer (148 feet) and because heavier fishing gear was needed for the survey. This paper describes the rigging to serve as reference for future research cruises and for possible application to large commercial vessels.

### Deck Layout

As a basic support for handling the dredge gear, the Delaware is fitted with a 16-foot 7-inch long piece of 16-inch I-beam secured to welded brackets on the foremast (fig. 2). The I-beam extends horizontally and athwartship from the mast to about 2 feet beyond the rail. The outboard end of the beam has a 9-foot 7-inch long support of 6-inch steel pipe stepped on the deck. For additional support, a $\frac{3}{4}$-inch steel cable secured under the crosstree of the mast is attached at the outboard end of the

Fig. 1 - Converted shrimp trawlers used in surf clamming.

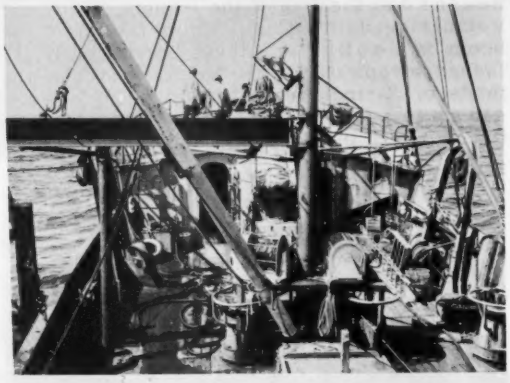


Fig. 2 - Deck layout on the Delaware when surf clamming.

*Fishery Methods and Equipment Specialist, Exploratory Fishing and Gear Research Base, BCF, Gloucester, Mass. 01930.

1/Statistics based on BCF figures, New Jersey Landings, C.F.S. No. 4335, December 1966.

Note: This is Equipment Note No. 22.

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I-beam. At the beam's outer end, a swivel hanging bollard is installed for a 1-inch haulback cable; this cable is shackled to the forward end of the dredge on the crossbar between the shoes (or runners). The cable extends through the hanging bollard and two deck bollards to the port drum of the main trawl winch.

A hoisting boom for taking the dredge aboard is 31 feet 9 inches long and made of extra heavy-duty 8-inch steel pipe; the boom is fitted with a swiveling gooseneck at the bottom end. The boom is stepped on a base laid horizontal to but about 6 inches above the deck, between the two forward deck fairlead bollards. The base, 5 feet long, is made from two 6-inch by 5-foot long pieces of $1\frac{5}{8}$-inch flat steel; the two pieces are joined one above the other by two 6-inch square gussets of $1\frac{5}{8}$-inch steel. In the center of the base, a $2\frac{1}{4}$-inch hole is drilled through both pieces of steel; the gooseneck is inserted through both holes and pinned below the bottom piece. This method allows the boom to swivel in any direction. Each end of the base for the boom is welded to the steel base of the deck fairlead bollards.

When the dredge is hauled to the hanging bollard at the end of the I-beam, a luff (or watch) rigged lifting tackle from the top of the boom is hooked into three permanently attached straps on the dredge. The straps are made of $\frac{9}{16}$-inch welded chain. The forward strap is 5 feet long and is shackled onto the towing bar of the dredge. The remaining two straps are each 4 feet long and are secured to the forward part of the aftercage. All three straps are shackled into an 8-inch lifting ring made of $1\frac{1}{4}$-inch round steel. The topping lift for the boom is a twofold purchase; it is used for bringing the entire dredge across the vessel's bulwark. The lifting and the topping tackles are fitted with 8-inch steel blocks and $\frac{5}{8}$-inch galvanized wire rope. Two Marco[2/] W4050-S winches, each powered with Vickers[2/] M2-330 hydraulic motors, supply adequate power for handling the 48-inch dredge. The dredge weight alone is about 3,000 pounds; a full load of clams and bottom sediment weighs an additional 6,000 pounds (fig. 3).

## Towing Position

To tow the dredge with the shortest possible length of jet hose, a bow towing position is used. To implement towing from this position, a 48-foot long piece of 4-inch steel pipe was welded to the outside of the bow and the forward part of the keel. The adjustable towing cable is housed by this pipe (fig. 4). The towing cable is passed through it down to the dredge, and the dredge is towed beneath the vessel rather than behind it. So less hose

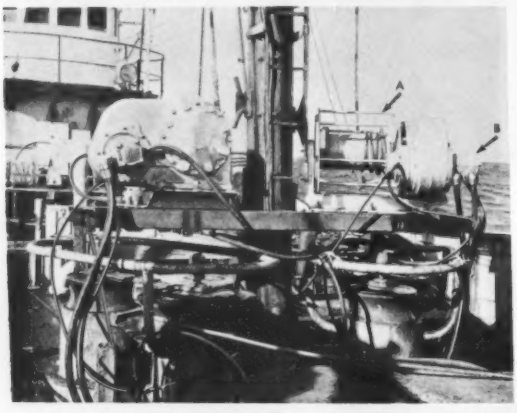

Fig. 3 - Winches (A) and hydraulic power units (B) used in handling surf clam gear.

Fig. 4 - Delaware's hawser pipe for the clam dredge towing hawser or cable.

2/The products and equipment used in this survey do not constitute endorsement.

is required and higher water pressure at the dredge results because of less friction in the shortened length of hose. Also, additional hose sections are not neeeded.

The dredge is brought aboard the vessel in the same manner whether towed conventionally or by using the bow hawser pipe.

LOBSTER BOATS

½ pound cooked lobster meat, fresh or frozen
24 fresh mushrooms, approximately 1½ inches in diameter
¼ cup condensed cream of mushroom soup
2 tablespoons fine soft bread crumbs
2 tablespoons mayonnaise or salad dressing
¼ teaspoon Worcestershire sauce
⅛ teaspoon liquid hot pepper sauce
Dash pepper
Grated Parmesan cheese

Thaw frozen lobster meat. Drain lobster meat. Remove any remaining shell or cartilage. Chop the lobster meat. Rinse mushrooms in cold water. Dry mushrooms and remove stems. Combine soup, crumbs, mayonnaise, seasonings, and lobster. Stuff each mushroom cap with a tablespoonful of the lobster mixture. Sprinkle with cheese. Place mushrooms on a well-greased baking pan, 15 by 10 by 1 inch. Bake in a hot oven, 400° F., for 10 to 15 minutes or until lightly browned. Makes 24 hors d'oeuvres.

This idea for entertaining is from a 22-page, full-color booklet, "Nautical Notions for Nibbling," released by the United States Department of the Interior's BCF. It is available for 45¢ from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. Ask for Market Development Series No. 10 (catalog no. I-49/49/2:10).

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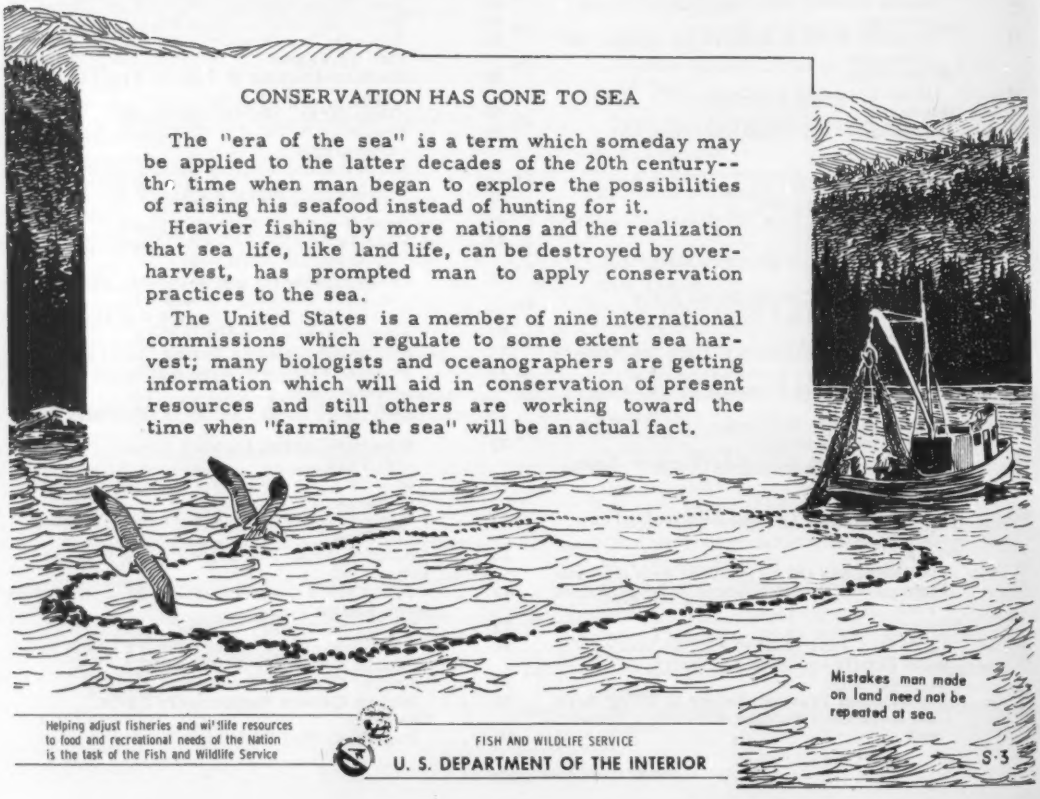
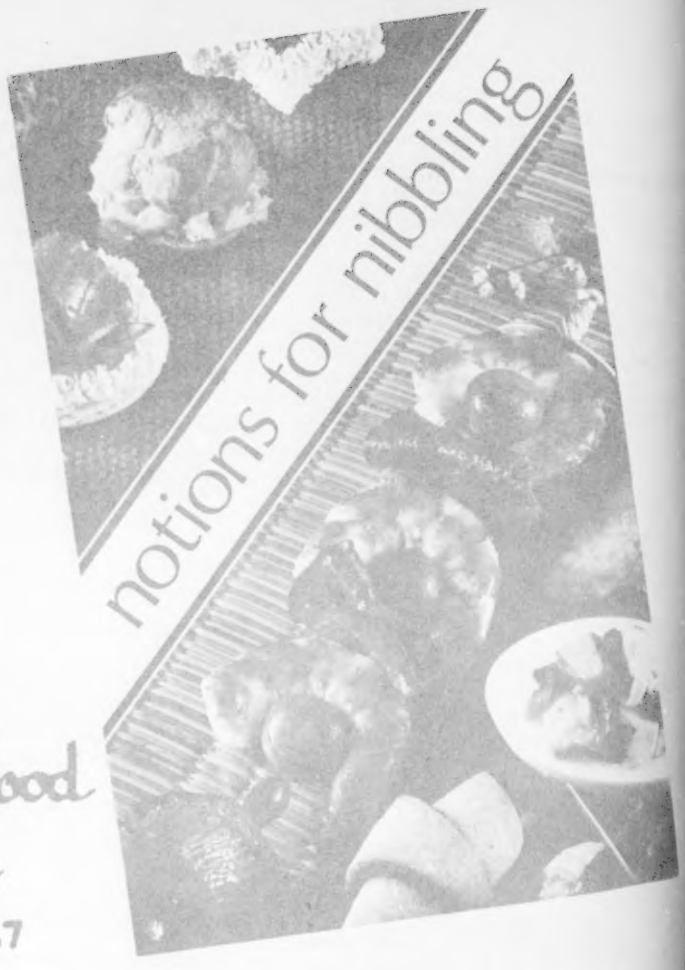

CONSERVATION HAS GONE TO SEA
The "era of the sea" is a term which someday may be applied to the latter decades of the 20th century--the time when man began to explore the possibilities of raising his seafood instead of hunting for it.
Heavier fishing by more nations and the realization that sea life, like land life, can be destroyed by overharvest, has prompted man to apply conservation practices to the sea.
The United States is a member of nine international commissions which regulate to some extent sea harvest; many biologists and oceanographers are getting information which will aid in conservation of present resources and still others are working toward the time when "farming the sea" will be an actual fact.
Mistakes man made on land need not be repeated at sea.
S-3
Helping adjust fisheries and wildlife resources to food and recreational needs of the Nation is the task of the Fish and Wildlife Service
FISH AND WILDLIFE SERVICE
U. S. DEPARTMENT OF THE INTERIOR

Created in 1849, the Department of the Interior—America's Department of Natural Resources—is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States—now and in the future.

UNITED STATES DEPARTMENT OF THE INTERIOR
Stewart L. Udall, *Secretary*
David S. Black, *Under Secretary*
Stanley A. Cain, *Assistant Secretary for Fish and Wildlife and Parks*
FISH AND WILDLIFE SERVICE, Clarence F. Pautzke, *Commissioner*
BUREAU OF COMMERCIAL FISHERIES, H. E. Crowther, *Director*



# Fish 'n Seafood Parade

## October 1967

To increase public awareness of fishery products, the U.S. Department of the Interior's Bureau of Commercial Fisheries is cooperating with the fishing industry in the annual October "Fish 'n Seafood Parade" promotion.

The Bureau searched the seven seas to bring a treasure chest of seafood hors d'oeuvres to turn Mrs. Homemakers' appetizer tables into boatloads of "Nautical Notions for Nibbling." Nautical notions are colorful, stylish and easy to do. So easy that a wide-awake hostess can prepare them ahead of time, put on the finishing touches at her party, and still have time to enjoy her guests. The Branch of Marketing distributed hors d'oeuvre color transparencies, black and white food photographs and press releases to major metropolitan newspapers throughout the country and arranged for public service radio and television time in October. Talk about a sea breeze, this promotion is designed to stir up a regular trade wind for smooth party-time sailing and help a hostess put some real sea legs under the most blase party appetites.

To give this promotion lasting appeal, the Bureau has prepared a 24-page color recipe booklet, "Nautical Notions for Nibbling," which gives instructions on how to easily prepare 25 different seafood hors d'oeuvres. Single copies may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 for 45 cents. Purchases of 100 or more sent to one address receive a 25 percent price discount.